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ORNAMENTAL SHRUBS AND WOODY CLIMBERS FOR CANADIAN GARDENS

by

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Ornamental Shrubs and Woody Climbers

During the past quarter of a century Canadians have had more time and means to develop adequate gardens around their homes. With this added development has come an increase in the general knowledge and appreciation of garden design. This in turn has led to an increased demand for variety; variety not only for the sake of novelty but in order that the garden may be attractive throughout the whole year and that it may express, through the use of well-chosen individual plants, a picture in keeping with the house, and the aesthetic ideals of its owner.

The honeysuckle, lilac, and mock orange, in their improved varieties, are still the most popular shrubs for general use and rightly so. They are, however, no longer all-sufficient for the Canadian garden.

The purpose of this bulletin is to supply the prospective planter of shrubs and vines with information which will assist him in the selection and cultivation of suitable sorts for his particular property. It deals only with these shrubs and vines in respect to their value in landscape development, and makes no attempt at botanical descriptions or classification.

THE USES OF SHRUBS IN THE LANDSCAPE

The planning, and planting of a garden on any given property presents its individual problems which of course cannot be dealt with in a general discussion. There are, however, four general ways in which shrubs are used in the development of a property, each of which calls for certain qualifications in the shrubs used.

Boundary Plantations

The first way in which shrubs are used is in boundary plantings to give privacy from the outside view, to screen unsightly objects, and to give unity to the garden scheme by acting as a frame and background to the garden proper.

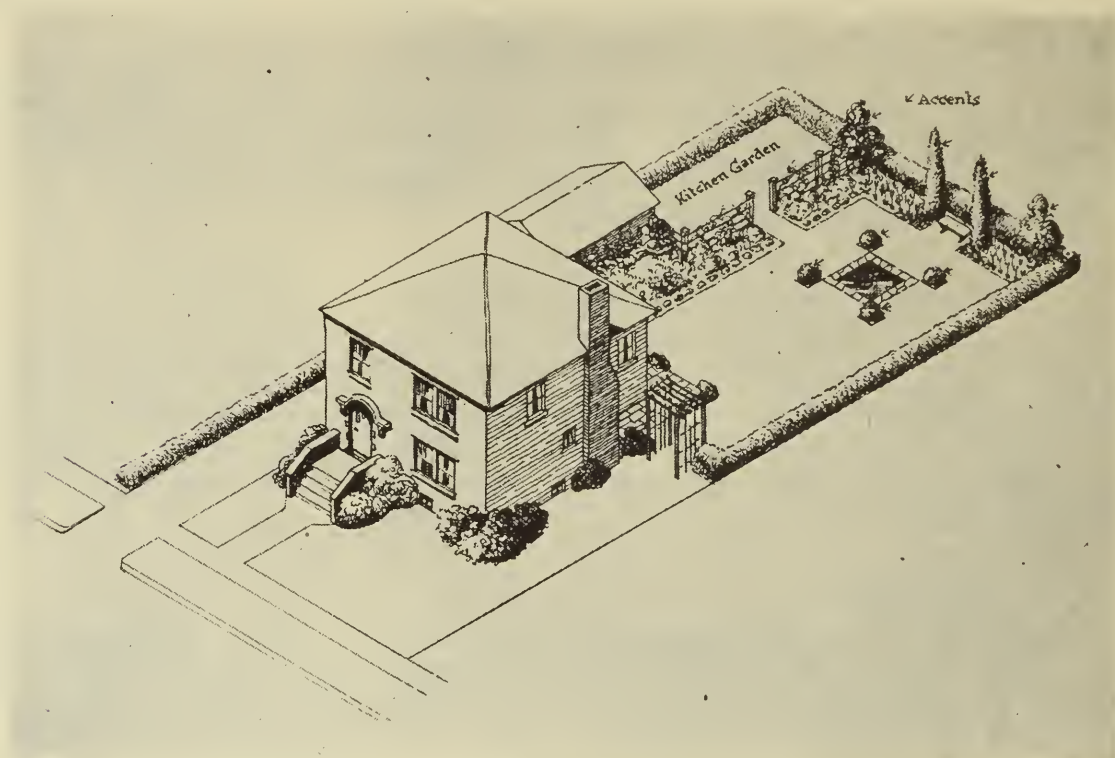
In such plantings one requires dense growth of sufficient height to shut off the view, and at the same time proper variety in height to render the skyline interesting. On small town properties one cannot hope to secure complete privacy, or to screen the view of all surrounding buildings. There the boundary planting will probably take the form of a hedge, or fence on which climbers may be grown. On large properties such plantings will consist of dense masses of trees and shrubs through which gaps, or vistas, are left so that one may obtain a desirable view in the distance, or so that those on the outside may obtain a view within.

As it is the effect created by the whole foliage mass which is of primary importance, shrubs are chosen for their rapid dense growth, average spreading habit of growth, and mid-green colour of foliage, rather than for their individual attractiveness. Their height will of course be governed by the desired skyline. Wherever bloom occurs it should be in large enough masses to create an effect at a distance, but while bloom is always attractive it is not so important a factor here as it is in the selection of shrubs which will be seen in more detail.

Specimens and Accent Points

Shrubs used as lawn specimens or accent points in a garden lend emphasis to particular features of the design. Such shrubs stand out alone, and are seen in detail. They should be of neat, usually erect, or gracefully drooping habit, and must have some particularly attractive feature such as bloom, vari-coloured foliage, or ornamental fruit. They must be shrubs of sufficient distinction to warrant a special position.

Specimen shrubs should not be scattered around indiscriminately where they will distract attention from the design, and main features of the garden picture. In the front of the property the house will dominate the picture, and it is much better to help it to do so than to create opposition by poor planting of ornate specimens. (See cut.)



Boundary plantings surround the garden proper and bind the whole into one picture. Accent shrubs are used to give emphasis to the design. Foundation planting at the corner connects garden and house.

Foundation Planting

The first way in which the view of the house may be helped is to frame it with masses of green foliage. On small properties groups of neat shrubs of average spreading habit, and medium to dark green foliage will draw the eye to the house, and build up from the horizontal line of the ground to the vertical lines of the house. This gives the impression of permanence which is so desirable, and which can never be obtained by planting herbaceous plants along the foundation.

Where the house is high and narrow, tall shrubs such as lilac should be placed just beside the front corners, but not hiding them. This will give added width, particularly if the shrub planting can be carried out farther to the side and gradually tapered off to the ground by using lower growing shrubs.

If the house is wide and rambling, tall columnar plants, like the pyramid cedar, or erect growing shrubs, like the large mock orange, may be planted in front of the bare wall spaces to break up the extra width.

The old idea of having the house "peek" over a solid green bank of shrubs is becoming less popular as appreciation of good architectural design increases. Such plantings are only advisable to hide high, or poorly designed foundation lines.



The high ugly lines of a house can be softened by shrubbery which builds up from the horizontal line of the ground to the vertical lines of the house.



Good points in architecture are brought out by conifers in strategic positions.

Good points in the architecture of the house, such as an attractive entrance, may be emphasized by the proper placing of shrubs of definite, and suitable form, such as many of the smaller conifers. The upright lines of colonial and Georgian doorways may be emphasized by framing with columnar plants or may be brought out by the contrast of low globular forms according as these seem to fit the house in question. The spreading farmhouse type is carried out by the soft spreading lines of deciduous shrubs, or contrasted by the occasional upright form of a columnar juniper or Lombardy poplar in the background. Very rarely attention may be drawn to an attractive feature by

further emphasizing it with a particularly showy shrub, but as a general rule foundation planting should depend on the beauty of neatness, and form, rather than a spectacular display of coloured foliage.

Plants which grow large naturally, such as spruce, pine, and native white cedar, have no proper place in foundation planting. Plants should be chosen, the ultimate height of which will not hide desirable lines of the house, or shut out light.

Partition and Background

In the garden surrounding the house, shrubs are used to separate the various areas. Here they act as partitions between the "rooms" of the garden, and as backgrounds for the more colourful displays of herbaceous plants. Because these partitions are always seen in elevation, they must be thought of as we will see them at maturity, when the groups are being planned.

When good shrub plantings are considered in this way, they are found to consist of three general classes which are here discussed briefly.

Dominant

The height of these garden groups and partitions is in general governed by the scale of the whole garden. Great charm, however, is added by the diversity of the skyline. High points are introduced to give emphasis to particular points in the design. They are used to give added boldness to the promontories, and deep masses of planting in a shrub border, to mark entrances, or to frame views. To shrubs used in such situations the term "dominant" is applied. Such shrubs should be of erect, stiff habit of growth, coarse in texture, and away from the average in colour of foliage, or bark. Lilac, with its tall erect habit and large dark green foliage, is frequently used as a dominant plant. Viburnums, or in milder climates the purple leaved plum, are suitable, while small trees like Japanese lilac, flowering crab, or silver birch are frequently used.

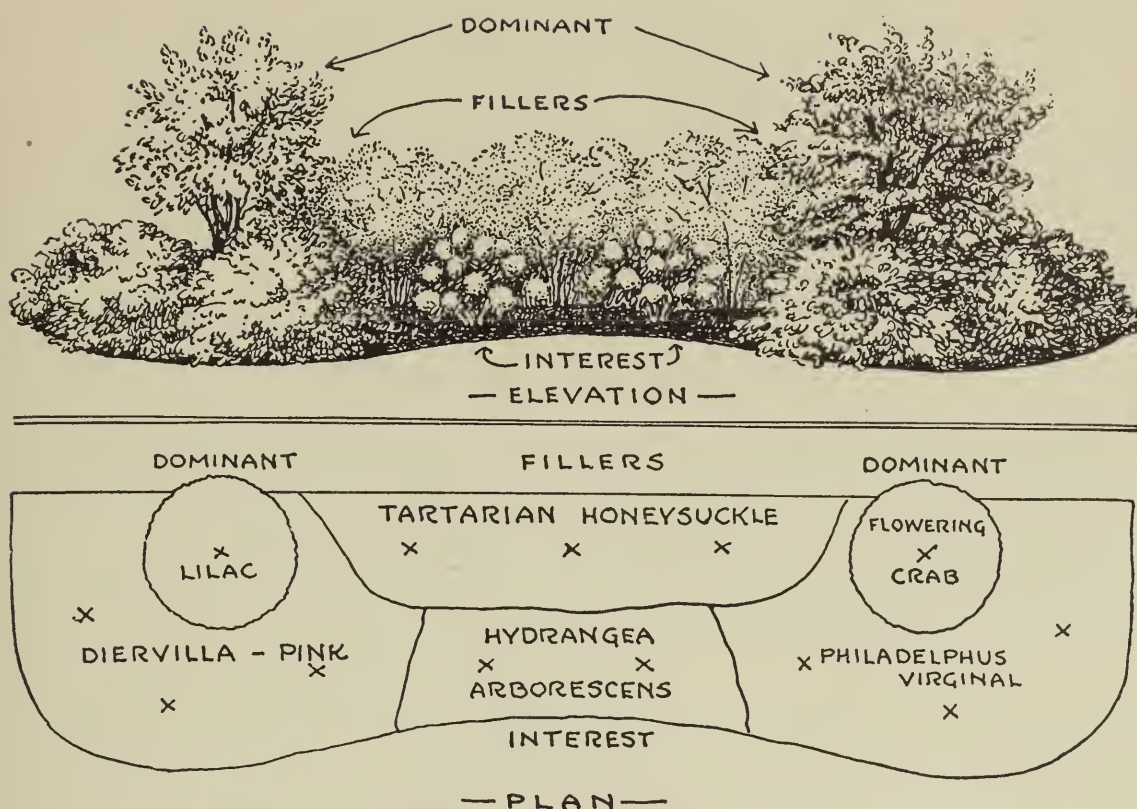
Fillers

Height, of course, is relative. These tall shrubs are dominant simply because they are taller and more conspicuous than the general shrubs of the group which are known as "fillers". These are shrubs of average height, attractive enough in themselves, but chosen mostly for their ability to blend together. They may at some season be particularly attractive in bloom, or fall foliage, but their primary purpose is to bind the more interesting garden features into one picture.

Interest

Some points of the design will require emphasis without extra height, or even with height diminished. In an informally curving border bays will be deepened, and low spots emphasized by a group of particularly pleasing plants, which draw the "interest" because of bloom, foliage, or habit of growth. Horizontal or low spreading habit will draw the eye down from the round-headed spreading shrubs. Light, or variegated foliage will hold the attention and so emphasize the point at which such shrubs are planted.

While these dominant and interest plants are needed to give character to the grouping, distinct contrasts of this sort must be in minority or they lose their purpose. Each shrub in a group which is to be seen closely must be attractive, but unless the general effect is blended with only an occasional note of contrast, there will be too much variety for the eye to take in at once, and the result will be a confused jumble. Contrast should be used sparingly and shrubs blended according to texture and foliage colour.



Plan and perspective of shrub group showing (a) Dominant, (b) Fillers, (c) Interest shrubs.

Texture

Texture in shrubs really amounts to the coarseness or fineness of twigs and foliage. Coarse texture tends towards dominance and so should be kept in the background except where extreme boldness is desired. Because the detail in fine-textured shrubs is indistinct at short distances, such plants create the illusion of lightness, and increased distance necessary in small gardens. The most pleasing general arrangement is to have the fine-textured shrubs in the foreground gradually blending to coarser ones at the back. A reversal of this has the same effect as throwing the back of a picture out of focus in photography in order to give emphasis to the foreground.

Foliage Colour

The same general rule of blend rather than contrast applies to arranging shrubs on the basis of their colour of foliage. Bright colour in the foreground blending to the darker blue-greens and purples in the back gives an illusion of depth whereas a reversal tends to flatness.

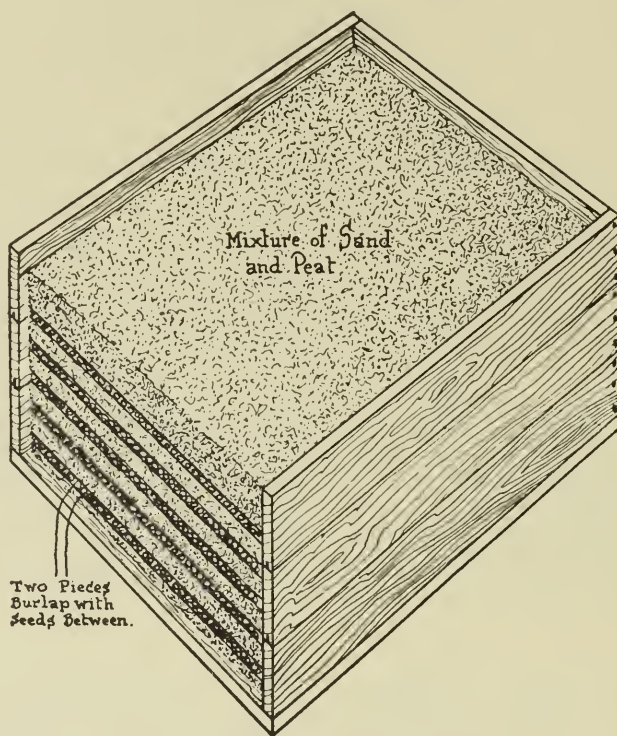
If these points are kept in mind in the selection of shrubs, bloom will no longer be considered the point of primary value. If the shrub groups are properly arranged bloom is not so important, though desirable, and much appreciated. Even the best of shrubs only bloom for a period of a few weeks, whereas attractive habit of growth, texture and foliage colour if properly arranged create a desirable picture throughout the whole season.

The points to watch, therefore, are height, habit of growth, texture and foliage colour. If these are right a pleasing mass of foliage is assured throughout the season. After that, bloom, colour of autumn foliage and fruit and decorative wood, are all features which add to the desirability of a shrub. Because soil can be modified it does not play a very large part in the selection of shrubs except in large plantings.

The tables at the back of this bulletin are arranged to give these items of information about each shrub grown at the Central Experimental Farm which is considered worthy of a place in the garden. No table of this sort can give sufficient information to enable the inexperienced layman to create a really artistic grouping. That can come only through a thorough knowledge of shrubs, coupled with training in design so that one may know the sort of picture he wants to create. However, the above discussion coupled with these tables should help in avoiding the mistakes which so often discourage people from further attempts at landscape development of their properties.

PROPAGATION OF SHRUBS

In nature, plants reproduce by seed, or by sending up suckers from their roots. Some shrubs, like dogwood, throw out roots wherever a branch becomes covered with soil. This is known as layering, and involves the least labour of any sort of propagation. The branch or sucker merely has to be dug up, severed from the parent plant at a point below the new roots, and the young rooted plant placed in its permanent position, or nursery row.



Method of stratifying seeds.

Most shrubs, however, are horticultural developments, either sports from a single species, or hybrids resulting from the cross pollination of two or more species. Such plants do not come true from seed, and as many of them do not throw up suckers, or root by layering, man has had to devise ways of propagating these shrubs vegetatively, so the methods known as propagating by "cuttings", "grafting", and "budding" have been developed.

Seed

Seed should be saved only from healthy individual plants which are typical of the species to be reproduced. The seed should be harvested as soon as it is

ripe to prevent loss by dropping. The cones of conifers, such as cedar and cypress, should be gathered as soon as they commence to open at the tip. Most pods, berries, and pulpy fruits will show maturity by their colour.

Most seeds should be removed from their natural containers, air dried, and cleaned before sowing. Some berries, however, may be left intact. Seeds of some plants, such as cedar, cypress, and fall ripening maples may be cleaned and stored over winter in a dry, cool room, or in the case of small quantities, kept in closed tins or jars. However, most shrub seeds require an after-ripening process before they will germinate. This necessitates their storage under slightly moist conditions. This process is known as stratification and is usually carried out in the following manner: A layer of half sand and half moist peat moss about one inch deep is placed in the bottom of a wooden box, and a piece of burlap, or copper screening placed over it. The peat should be thoroughly soaked and the water squeezed out firmly with the hand before mixing with the sand. A shallow layer of seed is then spread over the screen, and another piece of screen placed over the seed. Then more sand, and peat, followed by another layer of screen, seed, etc., repeating the layers until the box is full with a sand and peat layer on top. The box must be protected from mice, and placed in a cool room. The temperature varies with the species, but in general should be between 32° and 40° F. The boxes must be watched carefully, and the seeds sown as soon as germination starts.

As different species require different storage treatments in order to secure the best germination, the following groups, with notes on their treatment, may prove helpful. They are mainly compiled from tables prepared by Dr. L. C. Chadwick, Associate Professor of Floriculture, Ohio State University, together with observations of the author.

(1) Seeds which may be sown in cold frames as soon as gathered, as their period of after ripening is short. These may also be cleaned, air dried and stored in closed containers until spring.

Amorpha	Cytisus	Rhodotypos
Berberis	Exochorda	Sambucus
Caragana	Genista	

(2) Clean and store dry until stratification. Stratification period two to three months.

Ligustrum	Malus	R. multiflora
Lonicera	Rosa rugosa	

(3) Clean and store dry until stratification. Stratification period three to four months.

Amelanchier	Prunus	R. Hugonis
Euonymus	Rosa carolina	R. setigera

(4) Stratify in fall as required period is four months or more.

Cornus	Hamamelis	R. rubrifolia
Crataegus	Ribes	Viburnum
Halesia	Rosa canina	

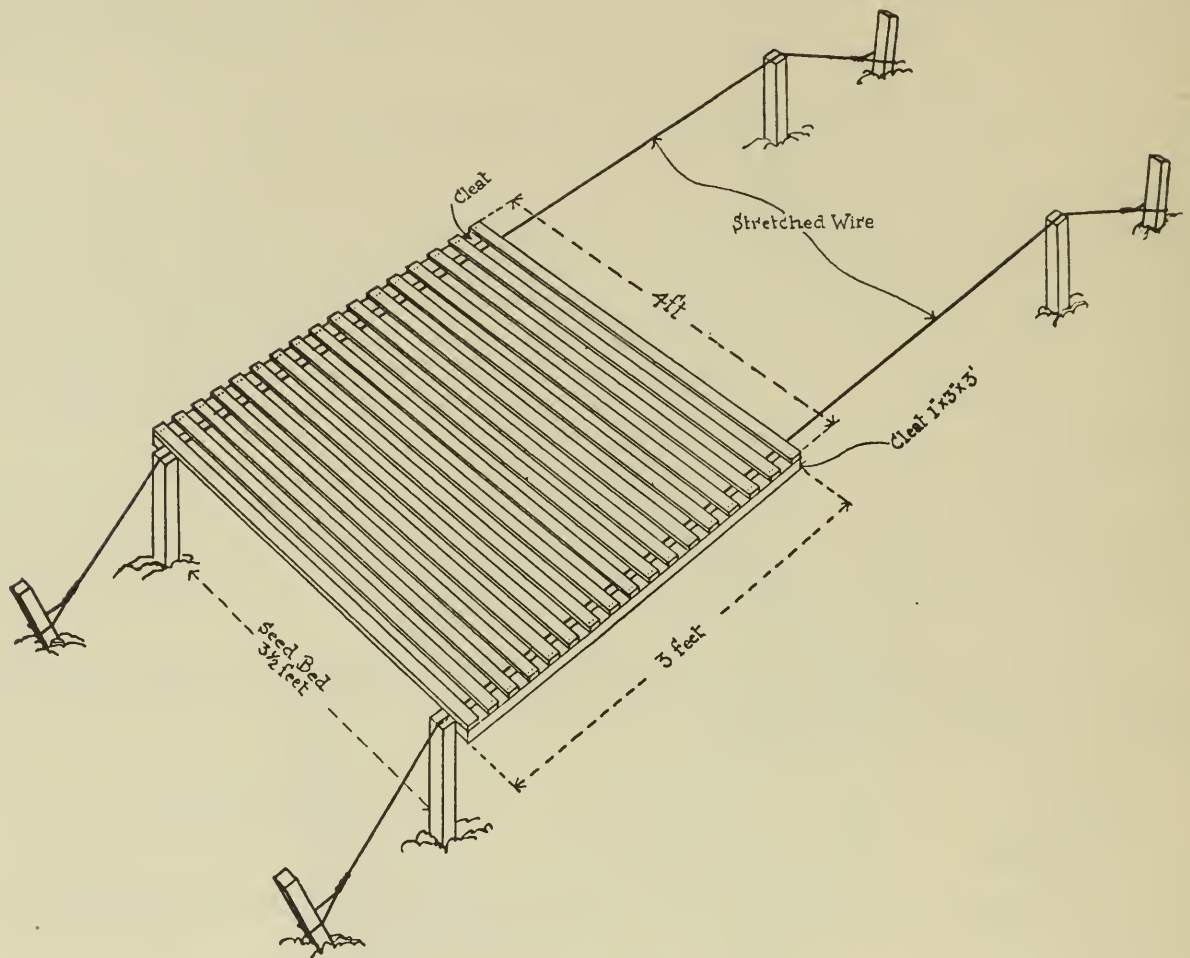
(5) Clean, and treat with concentrated sulphuric acid for $\frac{1}{2}$ -1 hour, then wash thoroughly and stratify for three to four months. This treatment will usually save a year in germination.

Cotoneaster

Symphoricarpus albus

The usual time to sow seed is in the early spring except where otherwise noted above. The seed-bed should have been thoroughly prepared the previous season. The best site is a piece of level, well-drained land protected from the prevailing winds by trees, or buildings. The best soil is finely pulverized rich

sandy loam. It should be kept in fallow during a large part of the previous season which will save much labour in weeding. As soon as the soil is fit to work in the spring, the bed should be dug deeply and all stones and rubbish removed. Then it is raked into level beds 4 feet wide with a 2-foot path between. The beds are lightly rolled and the seed broadcast thinly over the surface, or planted in rows about 2 to 3 inches apart. The seed should be rolled in lightly and covered to about twice its depth with finely sifted soil.



Method of supporting lath shade over seed-bed.

The soil must be kept moist but not wet until the seed germinates. A thin covering, such as burlap, may be placed over the bed until germination commences, to conserve moisture, or the bed may be covered with pulverized peat moss.

For the first few weeks of the young plant's life the chief dangers are from allowing the plants to dry out, or from the attack of fungi which cause "damping-off". The latter is particularly prevalent in thick stands of young plants where the soil has been allowed to remain wet rather than moist. Thin sowing coupled with careful watering is the best means of prevention.

The young plants should be shaded for the first few weeks by means of lath shades, which may be made as in the illustration. These may be easily supported by means of No. 12 gauge galvanized wire stretched over the top of a row of stakes placed every 6 to 8 feet down each side of the seed-bed and projecting about one foot above ground.

The young plants may be left in the seed-bed until they are one year old and are then planted into similar beds 6 inches apart each way, or set out in nursery rows in the field, according to their rate of growth.

The plants should be transplanted every second year in the nursery, until they are planted in their permanent positions. This creates a compact fibrous root system which makes planting reasonably safe at any size.

Cuttings

The majority of shrubs, however, are horticultural varieties which do not come true from seed, and most of these are grown from either hardwood or greenwood cuttings.

Hardwood Cuttings

A large number of shrubs common to Canadian gardens are grown readily from cuttings taken in the fall after a few light frosts have ensured the thorough maturity of the wood of the past season's growth. This wood is cut into lengths containing two to four healthy leaf buds. The cuts must be made cleanly with a sharp knife, with the basal cut just below and the top cut just above a leaf bud. The cuttings will be from six to ten inches in length and are tied in bundles of 50 to 100, with the butts all pointing the one way, and are buried horizontally in sharp sand in a cool cellar, or cold frame.

In the spring they are planted out about six inches apart, in nursery rows, in well-drained sandy loam soil. Usually they are planted on a slant against the side of a trench with only the top bud, or pair of buds, above ground. The earth must be packed firmly about the lower end so that it will not be dried out. Planting on a slant makes this firm packing more easily accomplished.

The cuttings must be kept free of weeds, and should be transplanted every second year. Usually at the end of two years they will be large enough to be placed in their permanent positions.

The following shrubs are commonly propagated from hardwood cuttings:—

Cornus	Ligustrum	Rosa (species)
Deutzia (coarse)	Lonicera	Sambucus
Forsythia	Philadelphus	Spiraea
Hydrangea	(coarse)	Tamarix
arborescens	Ribes	Weigelia

Immature, Soft, or Greenwood Cuttings

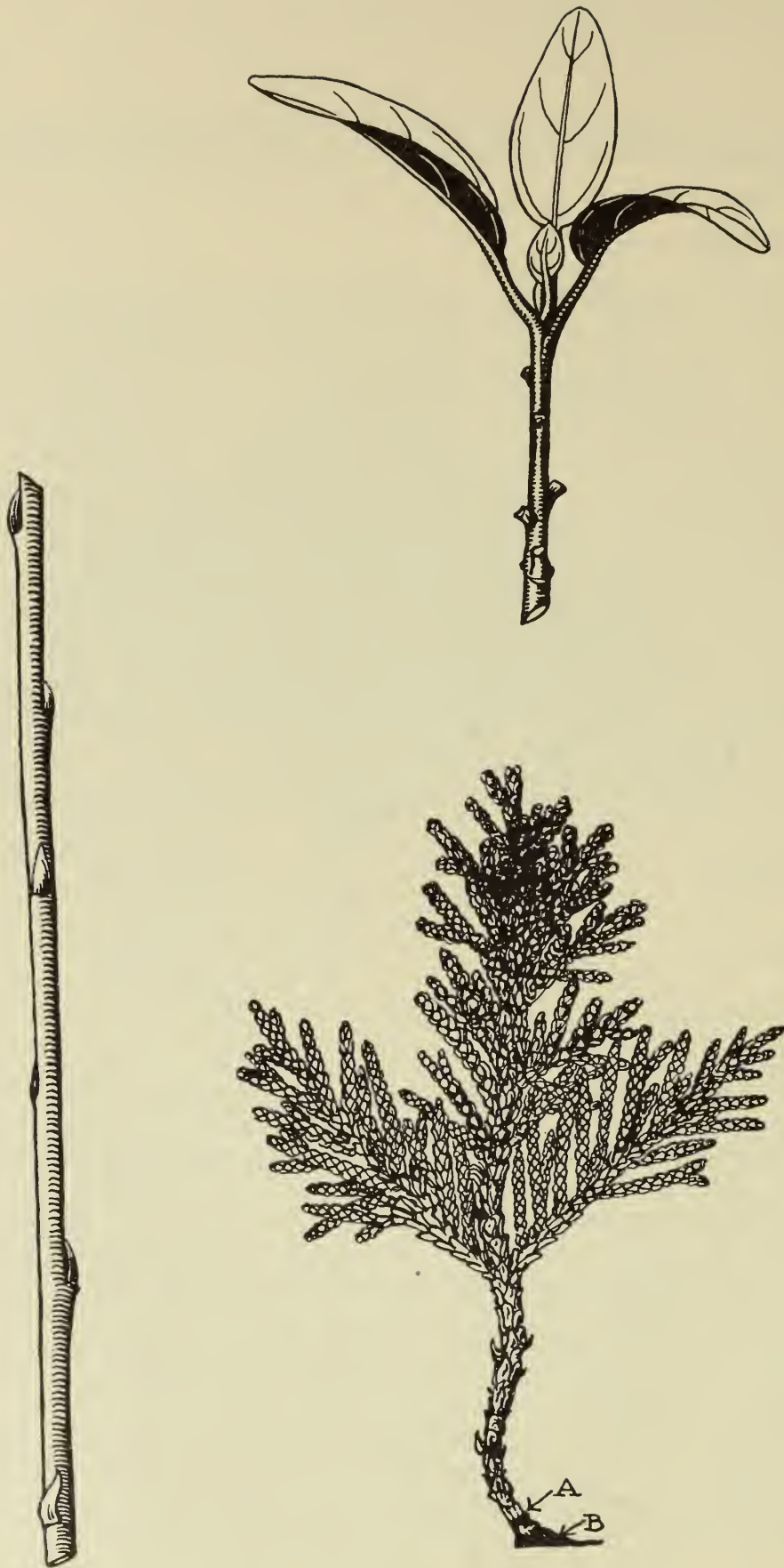
Most shrubs, including the above, may be reproduced by means of cuttings of immature terminal growth taken at varying times throughout the growing season according to species. As this method involves more careful handling and attention, it is usually only practised with those sorts which will not root from dormant cuttings of mature wood.

Soft wood cuttings are of two main types: (a) Young terminal growths from 2 to 4 inches long, cut off just below a leaf joint or node; (b) Young lateral growths from 2 to 6 inches long torn from last year's wood so as to leave a heel of last year's wood attached.

In either case only the lower leaves are trimmed off, leaving three or four leaves at the tip. In the case of some very large leaved sorts, such as some lilacs, the top pair of leaves are usually cut in half.

As has been stated before, the correct time to take these cuttings will vary with the species, and the season. As a general rule the cuttings should be taken when growth in length is almost complete, but before the wood begins to ripen. The growth of most shrubs at this time will "snap" when bent between thumb and forefinger, much like a green bean.

The cuttings are planted in a mixture of half sand, half peat moss, in cold frames, or nearly spent hotbeds where a slight bottom heat is provided, and shaded from direct sunlight. The frames are kept closed except for a little



Left, cutting of mature wood; upper right, cutting of immature or "soft" wood; lower right, conifer cutting. (a) beginning of current season's growth, (b) heel of old wood.

ventilation during mid-day and the cuttings sprayed lightly with cold water at frequent intervals during the day. The secret is in keeping air temperature low and humidity high to prevent wilting of the leaves.

Experiments have shown that the bed in which the cuttings are to be planted should be treated 24 hours before planting, with a strong solution of potassium permanganate at the rate of one ounce of crystals to one gallon of water applied at the rate of two quarts to each square foot of surface area. This seems to check development of the damping-off fungus. Also the oxidation which takes place in the soil seems to stimulate root production.

Growth Substances, or Plant Hormones

During the past few years substances called plant hormones have been widely advertised to stimulate root development from soft wood cuttings. Several tests have been carried on at the Central Experimental Farm with good results.

For the amateur or professional growing limited quantities, the safest practice is to purchase one of the commercial preparations, and adhere closely to the manufacturer's directions, remembering that deviation from the recommended treatment may cause complete destruction of cuttings. In general, the dust treatments prove most satisfactory. See Canada Department of Agriculture Circular 665, *Some Uses of Plant Hormones*.

The following shrubs are commonly grown from immature cuttings:—

Clematis	Forsythia	Philadelphus
Cotoneaster	Hydrangea	(slender)
Daphne	paniculata	Syringa species
Deutzia gracilis	Mahonia	Viburnum

though almost all plants will grow in this way under proper conditions of temperature and humidity.

Layering

Layering is used chiefly in private gardens. As only a few young plants can be produced from each parent the method is not sufficiently rapid for commercial use. The principle is to induce the plant to produce roots from its branches, then to cut off the branch below the root, and thus secure a ready-made growing plant.

Two methods are used: (1) Earth is banked up around the plant in July so that roots will be produced from the base of each branch covered. The plant is then dug up and divided, or the rooted branches removed and the stock plant left for future use. (2) Branches of the parent plant are bent over, pegged flat on the ground and covered with earth to a depth of three or four inches, leaving the tips of the lateral branches above ground. This work is usually done in July or August after the period of active growth is over. The branches are lifted the following year after roots are formed and the rooted portions cut off and planted.

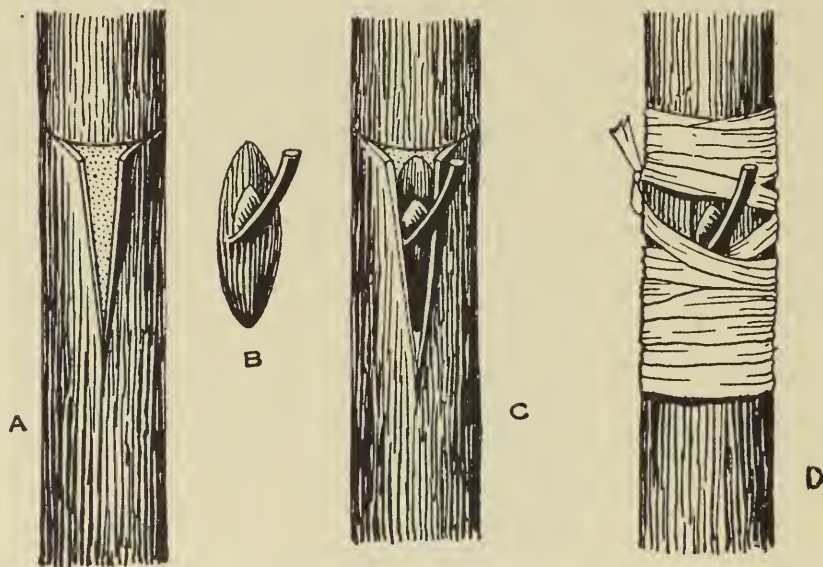
Grafting

Grafting is not often practised in the reproduction of shrubs though some may be done in this way. Wherever shrubs will not come true from seed nor strike satisfactorily from cuttings, other means must be used. Grafting is the means most commonly used in the propagation of many trees, but because this work involves more handling and is done in the winter the method is not popular with shrubs other than lilacs.

Budding

Budding is the method usually used to propagate all ornamental horticultural varieties of plum, lilac, rose, etc., which do not strike readily from cuttings. The actual time varies with the species, locality and season, but in most cases it is done in July or August. The proper time is towards the end of the season of active growth when there is still sufficient flow of sap to allow the thin bark to peel back from the wood without cracking, but not sufficient flow to exude from the wound. At this time also the buds in the axils of the leaves will be fairly well developed.

The stock upon which the desired variety is to be budded is usually as close a relation as can be grown readily from seed, or cuttings, and which is sufficiently hardy to stand the climate where it is to be grown. Lilac varieties are usually budded on common lilac, or privet, though green ash has proved perfectly satisfactory as a stock at Ottawa. The purple plum is budded on wild plum and the roses on wild rose stocks of various species.



Shield budding. (a) stock prepared for bud; (b) bud shield; (c) bud in place; (d) wrapped.

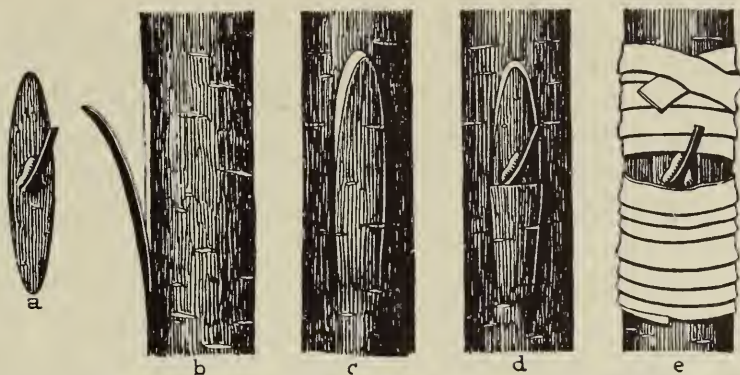
The stock should be from $\frac{3}{8}$ to $\frac{5}{8}$ inches in diameter, and in order that the bud should be placed as close to the root as possible without risking damage by flooding, the earth is frequently pulled away from the north side of the stock exposing the stem below the normal surface of the ground. With a sharp, thin-bladed knife, specially made for the purpose, a vertical cut is made low down on the north side of the stock about 1 to $1\frac{1}{4}$ inches in length. This cut should be just deep enough to penetrate through the bark to the wood. With a rolling motion of the knife blade, a second somewhat crescent-shaped cut is made across the top of the first to form a "T" with the ends of the cross-piece drooping a little. This droop helps in the next step which is to turn back the corner flaps of bark carefully to allow the bud to be inserted.

The buds are taken from as nearly mature wood of the current season's growth as can be obtained. The leaves are trimmed from the bud sticks but a portion of each leaf stalk is left to act as protection and as a handle to the bud in its axil. The bud sticks should be kept in water until actually needed.

With the knife, remove the bud from the stick with an accompanying shield of bark about one inch in length and wide enough to leave a margin of about $\frac{1}{16}$ inch of bark on either side of the bud as shown in the illustration. The thin sliver of wood which is removed with the bark may be removed or disregarded.

The bud shield is held by the leaf stalk, and pressed down into the cut on the stock so that it will be held in place by the corner flaps of bark on the stock. Any of the top of the bud shield which protrudes above the cross cut of the T should be removed. The union is bound firmly below and above the bud with raffia or rubber bands made for the purpose, care being taken that the bud itself is not covered. After a few weeks, when the union is made, the binding is cut off so that the bud will not be strangled.

If the work has been done at the proper time the bud will remain dormant until the following spring when the stock should be cut back to force growth into the bud. A few weeks later when the bud has made some growth the stock should be cut off flush with the union so that all growth will be forced into the bud, and the wound will heal over cleanly.



Jones' dry budding. (a) bud shield; (b) and (c) side and front views showing how bark is cut for insertion of bud; (d) bud in place and bark flap cut off level with base of bud; (e) bud tied in position with rubber band.

Sometimes it is necessary or desirable to bud shrubs at a season when the bark will not peel readily enough to permit the practice of shield budding. A method known as Jones' dry budding may then be used, and is particularly useful when the buds are dormant. The principle is the same as in shield budding but instead of making a T-shaped cut in the bark of the stock a shallow slicing cut is made down the north side of the stock just deep enough to expose the cambium layer and leaving a thin flap of bark about one inch long attached to the stock at its base. The upper half of the flap is removed and the bud shield placed on the wound with the cambium of the bud shield in contact with the cambium of the stock. The lower half of the flap is drawn up over the lower half of the bud shield and this flap and the upper part of the bud shield bound in place as in shield budding.

When the buds commence to grow the top of the stock is cut back as in shield budding.

CARE OF SHRUBS PRIOR TO PLANTING

Most land owners will procure their shrubs from a nursery. These shrubs need proper care between the time of their arrival and the time when they are actually planted.

Heeling In

As soon as the plants arrive from the nursery they should be unpacked and their roots placed in a trench preferably in some shady spot where the soil is moist. The roots should be covered with earth which is packed firmly to exclude air. Should the roots appear dry they should be dipped in water or thin mud before "heeling in".

Deciduous shrubs will usually be tied in bundles with their roots bare except for the moist moss packing. The bundles should be untied and the shrubs placed separately in the trench, but packed closely to conserve space. Shrubs which are "balled and burlapped", that is, which have the roots of each shrub and accompanying earth tied firmly in burlap, should be "heeled in" as they are. If dry on arrival the ball may be dipped in water for a few minutes.

Shrubs which are in leaf should be shielded from the sun and have their tops syringed with cool water frequently until they are planted.

Plants must never be left lying around with their roots exposed to sun or wind. Once the fine fibrous roots are dried out they are useless. A few minutes of sun or wind on bare roots may prove fatal.

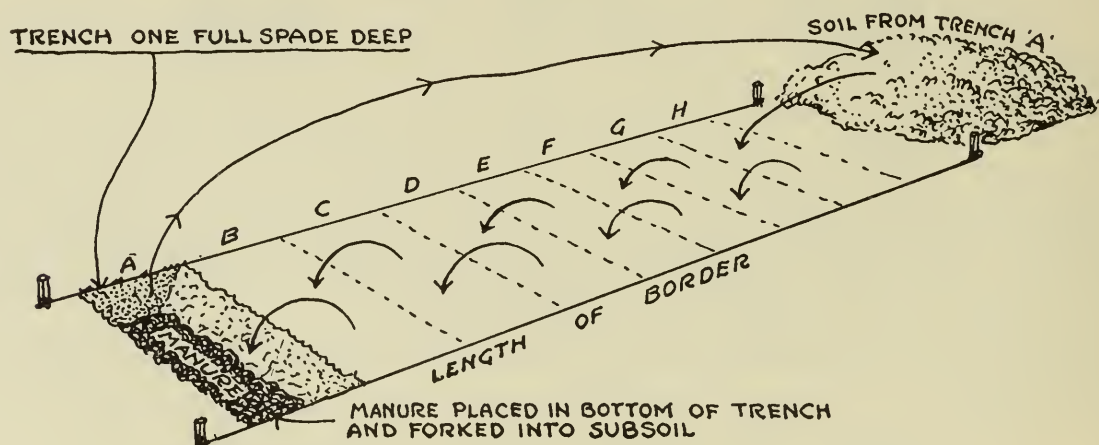
Defect in Shipment

If there is any shortage in the shipment, or any fault to find with the condition of the stock, or the method of packing, the nursery should be advised immediately the shrubs are unpacked. All nurseries who value their trade are anxious to have their plants give satisfaction, and will be glad to learn of any real defects in the shipment. But they cannot be expected to make good any defects which are not reported promptly.

PLANTING

Preparation of the Soil

Like all other plants, shrubs repay amply for good feeding, but they are often neglected because the majority of them are sufficiently industrious to secure enough food from the average soil to keep them growing in a more or less healthy condition.



Double digging the border: Top soil removed from A to A'; manure placed in bottom of trench and dug into subsoil; top soil from second section B placed on top of manured subsoil as indicated and so on down the border. Topsoil at A' put into last trench at H.

As shrubs are permanent the best method of feeding is to prepare the soil properly before they are planted. Where single specimens are to be planted large holes may be dug and a liberal dressing of well-rotted manure dug into the bottom. Good rich earth may then be filled in around the roots of the shrub when it is planted. Under modern practices of garden design, however, shrubs are more frequently planted in beds or borders. These should be double dug, or trenched with well-rotted manure.

Most shrubs prefer well-drained sandy loam though they will grow in a fairly wide range of soil. Where water-logged conditions exist artificial drainage may be supplied by using land tile, and the addition of manure and sandy soil helps to open up stiff clay.

In double digging, the top soil is removed from a section about 4 feet wide running across the width of the bed. This is placed to one side of the far end of the border. The second spade depth is then covered with 2 or 3 inches of well-rotted manure and this is turned into the subsoil just as in digging a vegetable garden. The top soil from the second section of the border is then placed on top of the manured subsoil in the first section and the lower soil manured and dug, and so on until the end of the border when the top soil from the first section is used to cover the manured subsoil of the end section.

In digging up sod land, the sod should be skimmed off and dug into the bottom along with the manure. Under no circumstances use fresh or heating manure when planting shrubs.

Time to Plant or Transplant

Shrubs may be moved with reasonable safety at any time when they are dormant, that is, from the time the leaves commence to fall in autumn until growth starts in spring. Coniferous and evergreen shrubs should be moved during September or in the spring. While there is less work in most gardens in the fall, and consequently this season is more convenient for new planting, the writer prefers spring planting as the plants are then firmly established before they are called upon to stand the rigours of winter. Frequently shrubs planted in the fall are heaved up by the frost and their roots dried out before they can be firmly packed again in the spring.

Digging the Hole

When it has been decided where the shrub is to be planted, a hole is dug large enough in diameter to accommodate the roots when spread out naturally, and deep enough so that rich loose earth may be placed in the bottom, and the shrub still planted a little deeper than it grew formerly. Budded or grafted shrubs should be planted with the union 2 or 3 inches below the surface. This will reduce suckering to a large extent.

The top soil is placed in a pile by itself, and the subsoil placed in a separate pile with all stones and other rubbish removed.

Pruning at Time of Planting

At the time of planting any broken roots or ones which have been dried out should be cut off cleanly. Shrubs should have their tops reduced to correspond with the reduction in their root system, and should be headed back so as to bring about a symmetrically balanced bush. The correct method is to thin out the top by removing the weaker branches and those which cross and rub.

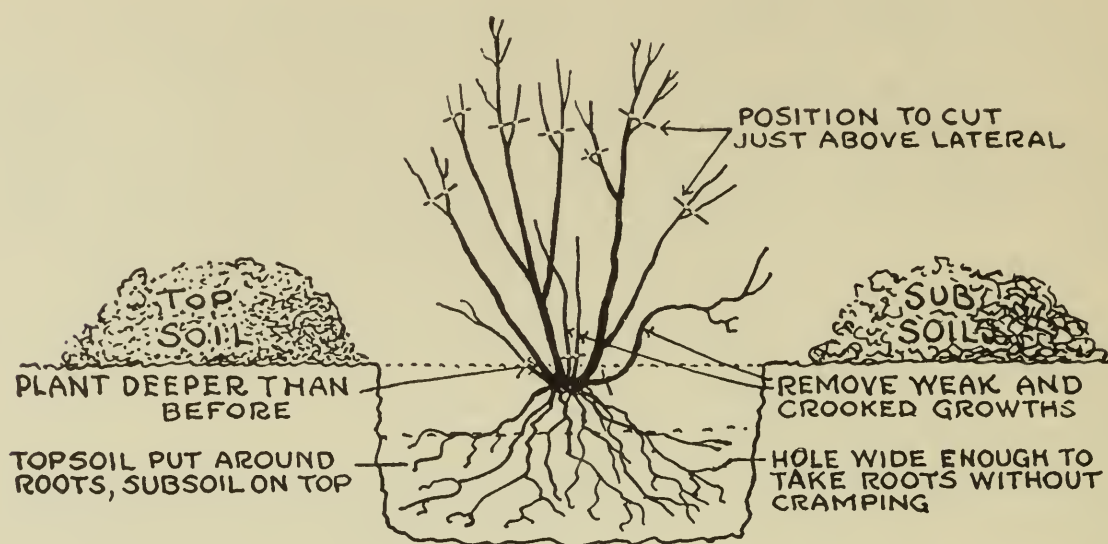
If the shrub has been well grown, little else will be necessary, but if it is tall and "leggy", each remaining branch should be cut back to a point just above a leaf bud or side branch which points outward.

Care must be taken to remove branches close to their parent branch so that no ugly stub is left to die and decay.

Planting

No attention should be paid to old superstitions or practices of putting oats, potatoes, or other foreign matter in the bottom of the hole. Nor should quick-acting chemical fertilizers be used in close proximity to the roots. The young plant needs only good soil firmly packed around the roots, plenty of moisture, and good drainage of surplus water to give it a proper start.

After the shrub has been pruned it is set in the hole about an inch deeper than it grew formerly, with the roots spread out in a natural manner. As the top soil is filled in around the roots the shrubs should be gently shaken up and



down to work the soil around each root. If the soil is sandy, and water can be obtained, the hole should be flooded after the roots are covered with loose earth, and the mud worked with a stick so that the water will carry fine soil down to fill up all air pockets. After the water has seeped away the remainder of the hole should be filled and the soil tramped down firmly. Clay soil should not be watered until after the hole is filled and tramped down, otherwise it will bake when it dries out, and become impervious to water and air.

CARE OF SHRUBS

Watering and Cultivation

If possible the shrubs should be watered until they are well established, and clean cultivation should be practised by stirring up the surface of the bed lightly with a Dutch hoe. Deep cultivation will cut many of the fine feeding roots, and is therefore to be avoided.

As soon as the shrubs are established a light application of commercial fertilizer may be scattered over the soil before watering. A pound to fifty square feet of bed surface is sufficient for young shrubs using a fertilizer which has about 10 per cent nitrogen, 6 per cent phosphorus and 4 per cent potash.

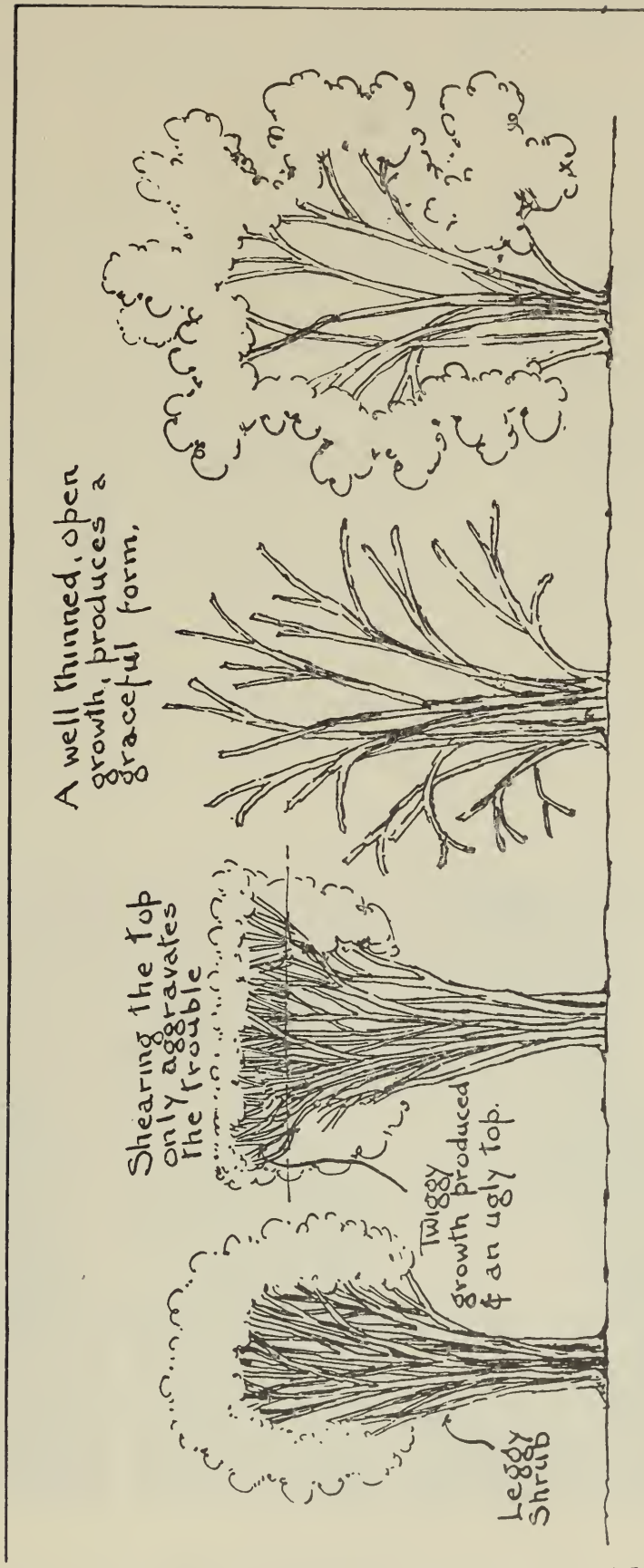
Older Shrubbery

In the case of older shrubs it will be found beneficial to mulch around the shrubs in the fall with a liberal dressing of well-rotted manure. This may be lightly dug into the surface soil in the spring.

The surface of the bed should be kept lightly stirred up until the end of July to keep down weeds and conserve moisture.

Fertilizers

While little accurate experimental work has been done to determine the best fertilizers for different shrubs and soils, it has been found beneficial to give them a start in the spring with a light application of commercial fertilizer. Quantity and type of fertilizer will vary with the size of shrub and type of



soil, but in general an application of 1 pound to 25 square feet of bed area using a fertilizer containing 9 per cent nitrogen, 5 per cent phosphorus and 7 per cent potash has given good results at Ottawa.

Any quick-acting fertilizer should be applied in the spring so that the succulent growth produced may be able to ripen before fall. Slow acting fertilizers may be added at any time.

Pruning

The pruning of young shrubs at the time of planting has already been discussed. This differs considerably from the pruning of established shrubs for general maintenance, and from the pruning of old neglected shrubs for rejuvenation.

The objects of pruning are to produce a graceful, well-balanced shrub of proper height, and to open up the shrub so as to allow sufficient light and air into the centre to produce healthy wood, and flower buds.

These objects can never be attained by clipping the tips of the branches to form a neat rounded ball. Except in trimming a hedge where thick, bushy growth is required, the branch tips of most shrubs should rarely be clipped.

Sometimes a branch or two must be cut back to give the shrub a balanced shape, but this should always be done by cutting back to a lateral branch, or bud which points outward.

Maintenance

For pruning purposes shrubs may be divided into two main classes, those which bear their flowers at the ends of growth of the current season, and those which flower from terminal or axillary buds formed on growth of the previous season.



Left: old lilac. Centre: one year after pruning. Right: two years after pruning.

The first class contains most of the late flowering shrubs such as Hydrangea, Sorbaria, Genista, etc. They should be pruned in spring by first removing all dead and weak wood close to the ground, or to the parent branch from which it

springs, and thinning out the balance by removal of the oldest wood, to a few of the healthiest canes. These canes are then cut back to a point just below the second or third bud on last season's growth. This will induce the production of strong new growth and consequently large bloom.

The second class contains the great majority of flowering shrubs such as lilac, mock orange, honeysuckle, Spiraea, Deutzia, flowering currant, snowball, etc. Most of these only require pruning every few years to keep them within bounds, and sufficient thinning out to prevent them from growing "leggy".

For general maintenance these shrubs should be pruned immediately after flowering to induce maximum production of young healthy wood with a resulting full bloom the following season. Fall or spring pruning of this class by the removal of young wood reduces the crop of flowers.

Shrubs of this class in general need only an occasional old branch removed close to the ground to keep them in fairly good shape. These shoots should be chosen in such a way that their removal will not harm the shape of the shrub and should be cut out without leaving a stub. At this time most suckers from the roots should be removed, leaving two or three to grow up to take the place of the old branches which have been removed.

In the case of named varieties of lilac, plum or flowering crab which have been grafted or budded all suckers should be removed.

Some shrubs of this class such as the hybrid mock oranges, Diervilla, etc., produce heavier crops of bloom if the old wood which has just flowered is cut out each year back to a point at which new growth is in evidence.

See notes on pruning at end of this section.

Rejuvenation

In pruning old shrubs which have been neglected for a number of years the treatment is more drastic. Such pruning is better done in spring with most shrubs. The severe reduction of branches later in the season seems to have an enervating effect, so that the shrub takes longer to recover.

The method is to cut out one-third or more of the old branches close to the ground, and to cut back the remaining old branches to a point just above their lowest lateral branch. This will force all growth into young wood and will result in the production of a quantity of suckers from the roots and adventitious shoots from the lower part of the old branches. These must be thinned out and encouraged to develop as normal branches.

The following spring or summer, half or more of the remaining old branches should be removed close to the ground, and the second year the rest of the old branches removed, leaving a shrub, formed entirely of new wood except for a few short trunks at the base. This young wood should be thinned out to form a well-balanced shrub.

NOTES ON PRUNING OF INDIVIDUAL SHRUBS

Acanthopanax	No regular pruning necessary.
Amelanchier	No regular pruning necessary.
Berberis	No regular pruning necessary except where grown as clipped hedge.
Caragana	No regular pruning necessary except to shape young plants.
Cephalanthu	No regular pruning necessary.
Cercis	Prune as little as possible.
Chaenomele	No regular pruning necessary.
Clethra	No regular pruning necessary.

Colutea	No regular pruning necessary, thin and cut back in spring to prevent bushes from getting leggy.
Cornus	Same as for Colutea. Where shrubs are grown for the winter effect of young wood they should be cut back heavily each spring.
Cotoneaster	No regular pruning necessary.
Crataegus	Immediately after flowering cut back flowering wood to second or third bud. Thin to retain shape.
Cytisus	No pruning necessary in Canada except removal of dead wood in spring.
Daphne	Same as Cytisus.
Desmodium	See Lespedeza.
Deutzia	Thin about every third year by removing old wood after flowering.
Eleagnus	No pruning necessary except to shape.
Euonymus	Most species do not require regular pruning.
Exochorda	No regular pruning necessary.
Forsythia	No regular pruning necessary. In mild districts <i>F. suspensa</i> may be cut back hard each year just after flowering.
Genista	Cut out dead wood each spring as in Cytisus.
Halesia	No regular pruning necessary.
Halimodendron	Shorten long shoots after flowering, do not prune severely.
Hamamelis	Prune only to maintain shape.
Hibiscus syriacus	No regular pruning necessary.
Hippophae	No regular pruning necessary, dig out suckers.
Hydrangea	Prune severely in spring. <i>H. arborescens</i> , thin out all weak wood and old wood, leaving a few strong year-old canes and cutting these back to the second or third bud. <i>H. paniculata grandiflora</i> , thin out weak wood and some of last year's growth. Cut back remaining growth of one year to second or third bud.
Kalmia	No regular pruning necessary.
Kerria	Remove dead tips in spring. Thin out older wood to encourage new growth just after flowers fade.
Kolkwitzia	Treat as in Weigelia.
Lespedeza	Cut back severely each spring.
Ligustrum	No regular pruning necessary except when grown as hedges.
Lonicera	Thin every three or four years by removing old wood after flowering.
Malus	Cut back flowering wood to second or third bud just after flowering. This in fall as necessary.
Mahonia	Cut out old wood and dead tips just after flowering.

- Philadelphus.....(Mock orange). Tall growing species do not need regular pruning. Thin out old wood every few years. Hybrid type such as *P. Lemoinei* do best when wood which has flowered is removed each year after flowering. Cut back to a point where young growth is in evidence.
- Potentilla.....No regular pruning necessary.
- Prunus.....No. regular pruning necessary. In mild districts *P. triloba* may have flowering wood cut back to second or third bud immediately after flowering.
- Rhamnus.....No regular pruning necessary.
- Rhodotypos.....No regular pruning necessary.
- Rhus.....Prune only enough to shape.
- Ribes.....No regular pruning necessary.
- Rosa.....Species require little regular pruning except to shape. When they become tall and leggy cut back very severely in spring. Hybrid teas and perpetuals are thinned out and cut back severely each spring. Remove weak wood, and cut back last year's growth to second bud.
- Salix.....Where grown for coloured bark cut back severely each spring.
- Sambucus.....No regular pruning necessary except to shape. Golden leaved variety should be cut back heavily each spring as foliage is brighter on new wood.
- Shepherdia.....No regular pruning necessary.
- Sorbaria.....Cut back severely in spring and thin out weak wood.
- Spiraea.....Those which flower from buds on last year's growth such as *arguta* and *Vanhoutte* need only occasional thinning immediately after blooming. Cut out wood which has flowered to a point where young growths are formed. Those which bear flowers on the tips of the current season's growth such as *A. Waterer* should be cut back severely in spring.
- Symphoricarpus.....No regular pruning necessary.
- Syringa (Lilac).....No regular pruning necessary other than removal of suckers and dead flower heads just after flowering. Old shrubs which have become leggy may be cut back very severely as described previously in text.
- Tamarix.....Need no regular pruning, in mild districts *T. pentandra* may be cut back to second or third bud of last year's growth in spring.
- Viburnum.....No regular pruning necessary. Dead wood of all shrubs may be cut out at any time it is observed.

Weigelia.....Thin about every third year by removing old wood after flowering. In mild districts train to a few main branches and cut back secondary flowering branches just after flowering to a point where new young shoots are growing.

NOTES ON PRUNING CLIMBERS

Actinidia.....No regular pruning necessary. When crowded thin out and cut back branches in spring.

Aristolochia.....As above.

Clematis.....As above.

Lonicera.....Little pruning necessary. If crowded, cut back and thin out after flowering.

Lycium.....Thin out occasionally. Cut back in spring, if crowded.

Parthenocissus.....More attractive when thinned out so that long arms break up bare wall spaces rather than cover them completely.

Rosa.....Rambler roses such as Dorothy Perkins should have old wood removed immediately after flowering. Others need little pruning other than removal of old and dead wood.

Tecoma.....Cut back branches in spring to second or third bud.

Wisteria.....Pinch off terminal growth of young shoots in July, leaving five or six buds, cut back to second bud in spring to produce short spurs.

NOTES ON ORNAMENTAL SHRUBS

Many species and varieties of ornamental shrubs have been tested at the Central Experimental Farm at Ottawa, and at the various branch farms and stations throughout the country since planting started in 1888. Records have been kept of the hardiness, height, habit of growth, etc. The following brief notes on those which have proved satisfactory may be of help to the prospective planter.

Only those shrubs are noted which have a fairly wide distribution. In southern Ontario and British Columbia there are several sorts which may be used with perfect safety which cannot be grown in parts of the country which have a more severe climate. Again some shrubs, such as *Symphoricarpus occidentalis*, are so hardy that they are used where other shrubs will not grow, but are not mentioned here since hardiness is their only virtue.

In a country the size of Canada where there is such a wide range in temperature, precipitation, and soils, it is impossible to recommend a list of shrubs for use in all sections. Prospective planters are therefore advised to refer to the table on page 46 which lists the shrubs and trees actually growing at the various Experimental Farms and Stations.

All scientific names used here are taken from "A Manual of Cultivated Trees and Shrubs", by Dr. Alfred Rehder, former curator of the herbarium at the Arnold Arboretum. This book has been used as the authority since it corresponds most closely with the rules for nomenclature laid down at the

International Congress of 1930. The correct name appears in italics. Synonyms which have been in common use appear in brackets after the correct name. The name or abbreviation of the name of the botanical authority is given in each case.

Acer ginnala, Maxim, Amur Maple. Frequently forms a small tree but is usually a rather open "leggy" shrub. The foliage and seeds are particularly attractive in the fall when their brilliant red adds interest to a mass of foliage. They should be used as a background for lower shrubs of greater interest, or as fillers in large shrubberies.

Acer palmatum, Thunb. Japanese Maple. This is much the same as *A. ginnala* from a landscape point of view. Though not nearly so hardy it is more graceful, and due to the many forms with coloured foliage, more ornamental. It is not hardy enough to stand the climate at Ottawa, although it grows well along the St. Lawrence River.

Amelanchier, Shadbush. There are several native species which bloom early in the spring, and are ornamental at a time when there are few shrubs in bloom. Some, such as *A. alnifolia* var. *pumila*, are quite dwarf; others may become small trees. Perhaps the most ornamental is *A. laevis*, Wieg., which is covered with loose drooping racemes of white flowers early in May. The young leaves which are just developing at this time are purplish and make a pleasing contrast with the flowers.

A. canadensis, Med. Is much like *A. laevis*, but the young leaves are downy on both sides and appear more silvery. They are also known as juneberry, service berry, and saskatoon, and in some species the fruit is used for jelly making.

Amorpha canescens, Nutt. Lead plant. An attractive summer-blooming shrub with divided leaves, and small, bluish flowers on long, close spikes. It grows about 3 feet in height, and looks well on a bank or in any stony or rocky place. It blooms during June and July.

Amorpha fruticosa, L. Indigo. A larger, more coarse and open shrub than the above. Though interesting and useful when planted behind lower shrubs which will hide the bare lower branches its chief attraction is its hardness.

Atraphaxis Billardieri, Spach. A low spreading shrub with greyish-green foliage, which produces numbers of small pink blooms in terminal clusters. It is a useful point of interest at the front of a shrubbery border particularly on dry soil where it can have a little shelter in winter.

Berberis Thunbergii, D.C. The Japanese barberry has been too commonly grown to need much introduction here. It is a low, compact, thorny shrub with bright green leaves which turn brilliant red in autumn. The flowers are inconspicuous, but the red berries borne in profusion in the fall and through the winter make it very attractive as a hedge, or in the front of a shrub border.

The red or purple leaf variety *atropurpurea* also makes a good hedge or interest plant in the border.

The variety *minor* is a smaller, more compact form, good for edging borders in formal work.

There is a recently introduced form *parviflora erecta* which is known in the trade as "truehedge columnberry". This appears to be an excellent hedge plant of narrow upright habit and attractive foliage. It is not quite so hardy as *B. Thunbergii* but is sufficiently hardy to use as a low hedge at Ottawa. As the plants are very erect in growth it should be planted from 6 to 9 inches apart.

Berberis Vernae, Schneid. A graceful but very thorny shrub with slender branches and dense clusters of small flowers, followed by red berries.

Berberis koreana, Palib. An erect shrub with rather coarse branches and larger bright green leaves than *B. Thunbergii*. The fruits retain their colour and the shrub appears to be as hardy as the Japanese barberry.

Caragana. Because the caraganas are so hardy and therefore useful on the prairies and in the northern districts they are described below rather more fully than their average attractiveness would warrant.

Caragana arborescens, Lam. The Siberian pea tree is one of the most useful hardy ornamental shrubs for it is really a shrub, though reaching a height of 15 to 18 feet or more. The foliage is attractive, and the yellow, pea-shaped flowers, which appear while the leaves are still young in May, make it a striking object during the spring. Because of its great hardiness and its ability to withstand drought, it is particularly useful on the prairies as a windbreak and for hedge purposes. It makes a very good hedge in Eastern Canada also.

The variety *Lorbergii*, Koehne, is a very attractive, fine-leaved form of graceful habit. There is also a dwarf variety *nana*, and a weeping one, *pendula*.

Caragana chamlagu, Lam. An upright bushy shrub about 4 feet high with dark green shiny foliage and reddish-yellow flowers.

Caragana frutex, K. Koch. (*C. frutescens*). A commonly grown form of erect bushy habit and dull, light-green foliage which is useful as a hedge or for massing as a background to more interesting shrubs. The one usually grown is the variety *macrantha*, Rehd. (*C. f. grandiflora*). There is also another fairly common variety with larger leaflets called *latifolia*. (*C. obtusifolia*). From an ornamental standpoint, however, they may all be considered as one shrub.

Caragana pygmaea, D.C. This species of caragana differs very much from the others, but has an attractiveness all its own. It is a comparatively low-growing shrub of spreading habit. The leaves are of duller green and narrower than either *C. arborescens* or *C. frutex*, and the flowers, which are in bloom in May, instead of being altogether yellow are orange and yellow. This makes a neat, low-growing hedge plant, though the leaves are too dull in colour for best effect.

When top grafted as a "standard" on *C. arborescens* this makes an attractive "accent" plant in a formal border or as a specimen.

Chaenomeles japonica, Lindl. (*Cydonia japonica*, Hort. *Pyrus japonica*, Thunb. *P. Maulei*, T. Moore). The Japanese quince is not hardy at Ottawa, the shrub usually and the flower buds invariably killing to the snow line. Hybrid forms have proved a little hardier, and in some years very attractive. This shrub with its shiny bright green foliage and brilliant red flowers, which open very early, is a fine plant for interest at the front of a shrub border in districts where it is perfectly hardy.

Chionanthus virginica, L. The fringe tree is a rather odd shrub of similar habit to that of the lilac. It produces long, loose clusters of small white flowers but unfortunately not in great profusion at Ottawa where it is scarcely hardy enough.

Clethra alnifolia, L. One of the latest-blooming shrubs, being in flower from July to September. It has small, sweet-scented, white flowers which bloom in compact racemes. This shrub succeeds best in rather moist soil. Another species, *Clethra acuminata*, is a taller grower, and is quite hardy at Ottawa.

Colutea arborescens, L. Bladder senna is a rather dull looking shrub with small compound leaves. Its foliage makes it a useful shrub as a "filler" in districts where the climate permits it to reach a good height.

Cornus alba, L. Siberian Dogwood. Attractive shrubs with red bark and good, dark-green foliage. The flowers are small, yellowish-white, in fair sized flattish clusters, and the fruit has a bluish-white bloom. There are two varieties

with variegated leaves which form in time compact notes of emphasis in a border. They are *C. alba argentea-marginata*, Rehd. (*C. elegantissima* Hort.) which has a silver edge to the leaf, and *C. alba spaethii*, Wittm, which has a golden variegation. The variety *sibirica* has lighter red bark and is not such a strong grower as the species.

Cornus alternifolia, L. The only dogwood with alternate leaves. A large shrub or small tree with dull purplish red bark and not particularly attractive.

Cornus stolonifera, Michx. Red Osier Dogwood. A red-barked spreading shrub useful in natural plantings where massed effects are desired. The variety *flaviramea*, Rehd., had bright yellow bark and is interesting in contrast to the others.

Cotinus coggygria, Scop. (*Rhus Cotinus*) Smoke Tree. A very attractive shrub with distinctive, round bluish-green foliage. The flowers are small and greenish in large, loose clusters. The stems of the many sterile flowers are covered with long hairs which turn purple and give the impression of a cloud of smoke, which is very lovely. The shrub frequently kills back at Ottawa but the foliage alone is sufficiently attractive to render it useful.

Cotoneaster. The shrubs of this large genus are grown chiefly for their attractive, dark-green foliage, and red or black fruits. Because of their hardiness they are proving particularly useful on the prairies. In the east two species are quite commonly used in rock gardens because of their low and spreading habit, these are *C. adpressa*, Bois, and *C. horizontalis*, Deecne. *C. acutifolia*, Turcz. and *C. intergerrima*, Med. are both useful shrubs as fillers as they have attractive foliage, habit of growth, and interesting fall fruit. These have proved particularly hardy. Another interesting species is *C. Simonsii*, Bak., a half evergreen species with very attractive red fruit which is unfortunately scarcely hardy at Ottawa. Unfortunately, the climate here is too severe for the evergreen species to retain their foliage except when covered with snow.

Crataegus. There are many hawthorns which can be used effectively in large shrub groups. Generally speaking, their horizontal habit of branching, and their attractive foliage create much interest. Unfortunately, from a descriptive viewpoint, the species and varieties are so badly crossed that few can be definitely distinguished except by trained botanists. The following are among the most useful native sorts:—

C. coccinea, Sarg. Shrub or tree to 30 feet.

C. crus-galli, L. Shrub or tree to 30 feet.

C. rotundifolia, Moench. Shrub or tree to 18 feet.

C. punctata, Jacq. Horizontally branching tree or shrub to 30 feet.

C. succulenta, Lk. Shrub or low tree to 15 feet with more ascending branches. It is proving useful on the prairies.

Cydonia (see *Chaenomeles*).

Cytisus, Broom. None of these is very common in Eastern Canada though a few of the lower growing species are fairly hardy, and quite ornamental as subjects for the rock garden, or as points of interest in sheltered bays of a shrub border. Perhaps the hardiest is *C. elongatus*, Waldst, and Kitt, with bright but rather pale yellow flowers. *C. ratisbonensis*, Schaeff., is very like it. These bloom the latter part of May and are quite showy.

C. nigricans, L, which blooms in June and July is more ornamental though not quite so hardy. The flowers are a richer yellow and borne in long slender racemes. *C. purpureus*, Scop. and some of its varieties though killing to the snow line each year bloom well and are attractive. Their pink to purple flowers in May look well at the front of a shrubbery.

C. Beanii, Nichols. Another yellow hybrid, is also useful.

Daphne Cneorum, L. A low trailing shrub with pinkish-purple flowers early in spring, useful in the rock garden where acid soil and good drainage can be provided.

D. Mezereum, L. Taller shrub to 2 feet rather straggly in habit; flowers white to rosy purple appearing before the leaves.

Daphne × *Burkwoodi*. The variety of this hybrid known as Somerset is a most popular bushy shrub of 3 feet with narrow bluish-green foliage and a profusion of fragrant lavender flowers in early spring.

Deutzia. None of the deutzias is thoroughly hardy at Ottawa though *D. Lemoinei*, Lemoine, is sufficiently robust to produce bloom occasionally. In warmer districts they are well known shrubs of bushy habit and profuse bloom.

D. gracilis, Sieb and Zucc, and its varieties are low growing, free blooming shrubs suitable for the front of the shrubbery border where hardy.

D. scabra var. *plena* (*D. crenata* fl. *plena*, Hort.). The well known Pride of Rochester, is a larger shrub with double pinkish flowers.

Eleagnus angustifolia, L. Oleaster, Russian Olive. A hardy small tree or large shrub chiefly valuable for its grey-green foliage.

E. argentea, Pursh. Silver-berry. A better subject for the shrubbery border than the above. Spreading habit of growth with silvery grey-green leaves and small yellow flowers in July. Very hardy but not so drought-resistant as the above. Both these shrubs are useful on the prairies.

Euonymus. Spindle Tree or Burning Bush. These are not particularly attractive at Ottawa except for the interest of their coloured winged fruits. The taller forms *E. alata*, Reg., *E. atropurpurea*, Jacq. and *E. europea*, L. are too open and irregular in habit to make attractive shrubs except on large properties. *E. americana*, L. the strawberry bush, makes a fairly interesting shrub as a filler while *E. nana* is a low growing attractive form for use on rocky banks or large rock gardens.

Exochorda racemosa, Rehd. (*E. grandiflora*) Pearl Bush. A slender-stemmed graceful shrub bearing terminal clusters of white flowers in spring.

Forsythia. Golden Bells. These shrubs all have yellow flowers which appear early in the spring before the foliage. Unfortunately the majority are not thoroughly hardy at Ottawa and only bear flowers on the wood which was below the snowline. *F. suspensa*, Vahl, is a gracefully arching shrub which looks well in large masses. Its variety *Fortunei* is quite similar though more erect and vigorous. The hybrid form *F. intermedia* is probably the most attractive form.

A more recently introduced species *F. ovata*, Nakai has proved hardier than the others at Ottawa. It is naturally a lower, more bushy shrub with paler yellow flowers borne a little earlier and will prove a very valuable addition to the old favourite shrubs.

Genista tinctoria, L. Dyers Greenweed. This shrub kills down to the snow line each year, but if cut back springs up vigorously and produces a mass of yellow flowers in the late summer. It is a very interesting plant in shrubbery bays. There are also various low forms useful for the rock garden.

Halesia carolina, L. Silver Bells. A large shrub only half hardy at Ottawa. It bears loose clusters of drooping white bell-like flowers.

Halimodendron halodendron, Vess. (*H. argenteum*). The salt tree is proving a very useful shrub on the prairies due to its hardiness and drought resistance. Its greyish or pale bluish-green foliage and pink-purplish bloom at the end of June also prove useful in the East under special circumstances. It also forms a good hedge which is impenetrably thorny. As it suckers badly when on its own roots specimen plants should be grafted on *Caragana arborescens*.

Hydrangea arborescens, L. Hills of Snow. Forms a low, round, coarse looking shrub with numerous large heads of greenish to creamy-white flowers which continue from June to September. One of the most attractive shrubs and very useful in shaded situations. It should be severely cut back and thinned out each spring.

Hydrangea paniculata var. *grandiflora*, Sieg. The p.g. hydrangea, or four seasons, is the hardiest and one of the showiest forms of the genus. It produces large trusses of creamy-white to pinkish bloom in August and September and is very attractive massed in the shrubbery or trained as a standard (tree shaped) specimen on the lawn.

Ilex verticillata, Gray American holly, useful only in large shrub plantings where natural effect is desired.

Kerria japonica, D.C. Rose of Japan. Although this shrub kills to the snow line each winter at Ottawa it puts forth new growth and usually blooms fairly well. The light green bark and leaves with the yellow flowers late in May and June make it useful at the front of the shrub border.

Kolkwitzia amabilis (Graebn)—Beauty Bush. This shrub should be used in sheltered positions much more commonly than it has been in the past. While it kills back in severe winters at Ottawa if exposed to wind, the graceful growth habit and profuse blooming make it an extremely attractive shrub. The pink flowers are trumpet shaped and smaller than those of *Weigelia*.

Lespedeza formosa, Koehn, (*Desmodium penduliflorum*) Bush Clover. This graceful plant is really not shrubby at Ottawa, as the branches kill to the ground every year, but strong stalks are thrown up from the ground each spring, and the shrub has usually a profusion of rosy-purple flowers in late September and early October. It is very graceful and attracts much attention when in bloom.

Ligustrum. None of the privets is thoroughly hardy at Ottawa though *L. vulgaris*, L. is fairly satisfactory and *L. amurense*, Carr. also makes a fair shrub. Whenever they will grow, their neat habit of growth and excellent foliage make them useful as fillers or shrubs for hedge planting.

Lonicera Morrowii, A Gray. Morrow's Honeysuckle. This white to yellow flowered shrub is lower and more spreading in habit than the common bush honeysuckle. It is very ornamental and useful for many purposes. To be at its best it needs regular pruning.

Lonicera spinosa *Alberti*, Rehd. Albert's Honeysuckle. A gracefully arching shrub of almost prostrate habit which forms a mound of small, dark blue-green leaves. It has quantities of pink bloom in June and is useful for covering banks or in rock gardens.

Lonicera tatarica, L. Common Bush or Tatarian Honeysuckle. This very excellent shrub is too old a favourite to need introduction here. It is very hardy, has good habit of growth and foliage and attractive bloom and fruit. Many varieties have been tried at Ottawa. Among the best are:

latifolia, Loud. (*splendens*) large leaves, pink flowers.

rosea, Reg. Flowers rosy pink outside, light inside.

alba, Loisel. Flowers pure white, medium size.

grandiflora, Rehd. (*alba grandiflora*) Leaves and white flowers larger than above.

sibirica, Pers. Flowers deep pink.

speciosa, var. *Carleton*. This is the most worth-while variety of *L. Tatarica* grown at the Central Experimental Farm. The flowers are large bright rose with darker lines inside.

Several other honeysuckles are proving useful at Ottawa mainly interesting from a collection standpoint as they are similar to the above in landscape value.

L. chrysantha, Turcz. Flowers yellow, berries coral red, leaves dark green.

L. deflexicalyx, Batal. Flowers yellowish, fruit brick red, leaves bright green more arching habit of growth than *tatarica*.

L. Korolkowii, Stapf. Flowers bright rose coloured, fruit bright red, leaves smaller than *L. tatarica*, blue-green and very attractive. This is one of the most ornamental shrubs when allowed sufficient space for full development.

L. Maackii, Maxim. Flowers white to yellow, fruit dark red, leaves dark. Tall erect shrub.

L. Ruprechtiana, Reg. Flowers white, fruit orange red, not so arching as *L. Morrowii*.

L. Xylosteum, L. Flowers white or yellowish, fruit dark red, leaves darker than the above and somewhat downy.

Mahonia Aquifolium, Nutt. Oregon Grape or Holly-leaved Barberry. A very attractive low-growing shrub. The leaves are very glossy above, and sometimes have a pleasing bronzy tint. The edges are toothed, and the leaf, on the whole, is rather suggestive of that of English holly. During the latter part of May this shrub blooms freely, there being numerous clusters of small, bright-yellow flowers. While this is an evergreen, the old foliage is usually browned and disfigured by winter unless protected with a little straw, but the new growth soon appears in any case and the old foliage is not noticed. It increases rapidly by suckers, and is excellent for underplanting in partially shaded places.

Malus. The flowering crabapples are deservedly popular small trees or shrubs which, because of their profusion of bloom in the spring, are often used as dominant notes in the shrubbery or as lawn specimens. As most of them, however, are rather irregular in habit of growth, and those which bear fruit are untidy, they are better used in conjunction with other shrubs where they will not be conspicuous except when in bloom or fruit.

M. baccata, Borkh. The Siberian crab is quite a large tree at Ottawa but useful in the shrub border in colder sections. It bears white flowers and small golden fruits in great profusion.

Malus floribunda Sieb. Flowers deep carmine in the bud, changing to pale pink when open, fruit very small and red. A very handsome small tree.

M. ioensis plena, Rehd. Bechtel's crab is a very good and popular double pink.

M. pumila var. *Niedzwetzkyana*, Schneid. Young leaves, flowers and fruit are all red. The tree is very irregular and only attractive when in bloom.

M. pumila Niedzwetzkyana C. E. F. hybrids have been introduced as "Rosybloom Crabs". These trees or tall shrubs are much superior to their seed parent in form, flowers and fruit. They are of varying habit of growth with exceptionally fine single flowers shading from light pink to deep rose red according to variety. Some of the larger fruiting ones have quite palatable fruit which may prove useful in districts where commercial varieties are not sufficiently hardy. The fruit of most varieties is good for jelly making. The small fruited varieties are very ornamental as the clusters of small purplish-red fruit are borne well on into late fall. The foliage also is ornamental, being of varying degrees of bronze green to red.

The following varieties are among the best:—

Early: Cowichan
 Simcoe
 Medium: Amisk
 Erie (alternate bearer)
 Timiskaming
 Late: Makamik
 Scugog
 Very late: Sissipuk

M. purpurea Eleyi, Rehd. Leaves and flowers red, fruit oval purplish-red, An attractive shrub or small tree.

Philadelphus, Mock Orange. (Frequently called syringa, which name confuses many people as it is the botanical name for the lilacs and should never be applied to *Philadelphus*.) These shrubs are deservedly among the most popular sorts. There are forms for almost any use as they vary extremely in size and habit. All prefer a well-drained, sandy loam soil with partial or full sunlight and repay by profuse bloom for regular thinning out of the old wood which has bloomed.

P. coronarius, L. Makes a splendid plant as a filler and its golden-leaved variety aureus is the best shrub for gold colour.

P. grandiflorus, Willd. A taller more erect shrub suitable as a dominant note in the shrubbery.

×*P. Lemoinei*, Lemoine. Smaller shrubs with smaller leaves and sometimes double flowers. There are many horticultural varieties of this hybrid and the best known are: Avalanche, Boule d'Argent, Candelabre and Mont Blanc. All of these are fragrant but in the further crossing of these with other species much of the scent has been lost.

Other good horticultural varieties tested at Ottawa, the parentage of which is too involved to note here, are: Argentine, Bouquet Blanc, Favorite, Glacier, Pavillion Blanc, Rosace, Virginal and Voie Lactae.

All are excellent varieties and any choice must be a matter of personal taste.

Physocarpus opulifolius, Maxim. (*Spiraea opulifolia*) Ninebark. A rather coarse shrub with long arching branches and bark which shreds off. It is effective as a filler in large groups or as a dominant plant in informal plantings. The red seed clusters are very attractive and the golden-leaved variety is useful in lending emphasis to points in a large border.

Potentilla fruticosa, L. Shrubby Cinquefoil. This is a native plant which does well under cultivation and blooms continually from June until autumn. The flowers are an attractive yellow which create a bright spot at the front of the shrubbery border. There are several varieties and all are very hardy and consequently useful.

P.f. grandiflora, Willd. Large bright yellow flowers, erect shrub.

P.f. pyrenaica, Willd. Dwarf compact form with yellow flowers. Suitable for rock garden.

P.f. Friedrichseni, Rehd. Large leaves, flowers pale yellow.

P.f. Veitchii, Bean. Flowers pure white, average size.

P.f. dahurica, Ser. Compact low form, white flowers.

Prinsepia sinensis, Oliver. This is a shrub of recent introduction chiefly valued for its attractive narrow, bright green foliage. Hardy on the prairies.

Prunus cerasifera *Pissartii*, Bailey, (*P. Pissardi*). A slender branched, erect growing plum with purple foliage and large, pink flowers. It is really too tender to be useful at Ottawa, but in milder districts is very useful as an accent point in shrubbery due to its very ornamental foliage.

Prunus glandulosa, Thumb. Flowering Almond, much like *P. nana* and *P. japonica*. The main difference from an ornamental point of view is in the foliage.

Prunus japonica, Thumb. This shrub is quite similar to *P. nana* but with broader leaves.

Prunus nana, Stokes. Dwarf Russian Almond. A small shrub which blooms early in May before the leaves are fully open. The flowers are pink, or white in the variety *alba*, and as the shrub is very hardy it is a useful one for spring colour.

Prunus pennsylvannica, L. Wild Red Cherry, and *Prunus virginiana*, L. Choke Cherry. These grow as trees at Ottawa but in colder districts are more shrubby in character and prove useful for spring effect.

Prunus tomentosa, Thunb. Down-leaf Cherry. It is desirable to have as many points of merit as possible in flowering shrubs, and this one is ornamental in flower and bears a useful fruit as well. It blooms early in May. The buds are pink, though the petals are white when they expand, and the calyx is red. It is a very hardy bush cherry. The fruit is small compared with the cultivated sour cherries, but is excellent when canned. This shrub is very hardy and has reached a height of about 10 feet at Ottawa.

Prunus triloba plena, Dipp. Flowering Almond. This double-flowered ornamental almond is one of the most attractive shrubs in spring; those on their own roots being the most satisfactory. When top-grafted on other stock they frequently winter-kill, and at Ottawa are not at all satisfactory, whereas when grown in bush form they bloom abundantly year after year, and the double pink flowers which are in bloom before the leaves are fully out, are very attractive and make this a striking looking shrub.

Rhododendron. None of the rhododendron hybrids is hardy at Ottawa. There is one species, *R. viscosum*, Torr., commonly known as clammy alder which grows satisfactorily in a sheltered position but is not outstanding ornamentally.

R. ponticum L and *R. molle*, G. Don., will both grow in sheltered positions, but the flower buds are frequently dried out during summer or killed by frost; the latter has usually been called *Azalea mollis*.

Rhodotypos scandens, Mark. (*R. kerrioides*). White Kerria. Where it is sufficiently hardy, this shrub is attractive at the front of a border. It has large white flowers and black fruits which persist well on into winter. It is not satisfactory at Ottawa.

Rhus Cotinus L. Smoke Tree. (see *Cotinus coggygia*.)

Rhus glabra, L. Smooth Sumac. This native shrub is chiefly valued for the brilliant red fall foliage and odd red fruits. It is very effective when massed on gravelly banks in natural plantings. The cut-leaved variety *laciniata* has very decorative foliage and may be used in a more refined setting.

Rhus typhina, L. Staghorn Sumac. A large shrub or small tree. More coarse than the above, with the young wood covered with velvety hairs like a stag's horn.

Ribes alpinum L. Alpine Currant. A broad spreading shrub of densely branching habit which bears greenish-yellow flowers early in spring. The pistillate shrubs bear red fruits. It is very hardy and useful on the prairies. The variety *pumila*, Lindl., is more dwarf and useful in the rock garden.

Ribes aureum, Pursh. Golden Currant. An attractive shrub of spreading habit with yellow somewhat fragrant flowers appearing with the leaves. The golden-coloured fruits are also ornamental.

Ribes odoratum, Wendl. Buffalo Currant. More spreading than the above with larger and more fragrant yellow flowers.

Robinia hispida, L. Rose Acacia. This is not hardy at Ottawa and its habit of growth is low and open. Where hardy it makes a good hedge plant as it suckers freely and is spiny. The rose-purple flowers rather like sweet peas, are very attractive in June.

Rosa. Roses. It is almost needless to write that the roses are among the most attractive shrubs. A separate paragraph has been given to two of the hardy species, but, in addition to these, there are such hardy shrubs as the Persian and Harison Yellow roses, Ausrian briars, the Provence or Cabbage roses, the Moss roses, the Damask roses, the Scotch rose and others. These are discussed at length in a separate bulletin.

The various rose species are excellent in mass plantings. They flower later and the blooms usually last longer than with most shrubs. Very fine combinations of colour can be arranged in foliage and wood as well as in bloom and fruit and they should be used much more commonly than at present.

Rosa rubrifolia Vill. Red-leaved Rose. This is such a distinctive shrub that it should be treated separately. The leaves are purplish red making it a striking object during the growing season even when out of bloom. The flowers are rather small and deep pink in colour and the fruit is bright red and shows up well after the leaves have fallen. It is very hardy succeeding well on the prairies.

Rosa rugosa, Thunb. This is a beautiful rose with fine flowers and very ornamental leaves, which are large, thick, and shiny. There is a white-flowered variety which is also good, also a number of hybrids between *rugosa* and varieties of Hybrid Perpetual and Tea roses, most of which are quite hardy.

Salix, Willows. As most of the willows are trees they will not be discussed here at length. They are, however, so useful due to their hardiness and ability to grow, either in wet places or dry sandy areas, that they sometimes fill the place of shrubs very well by what is known as "Pollarding" or "Coppice." That is, the trees are continually cut back severely so that they are held back to shrub size. The growth is bushy, erect and dense and the principal effect is gained through the colour of the bark, or the shiny green foliage. The chief willows used for this are *Salix alba* and its red and purple barked varieties.

Sambucus, Elder. There are several species of elder which make very satisfactory shrubs for growing near streams or other wet places. One species *S. racemosa*, L., the European red elder, blooms in May and has red berries. There is an attractive cut-leaved variety called *tenuifolia*, Carr. An excellent strain of this named the Redman elder has been introduced by the Dominion Experimental Station, Morden, Manitoba.

S. canadensis, L. Blooms in June and July and has purple black fruit. Its variety *maxima*, Schwerin, has immense panicles of flowers and is very attractive. *S. nigra*, L., the European elder, is much like *canadensis* but blooms earlier. It is chiefly used in its golden-leaved form *aurea* though it also has an attractive cut-leaved variety *laciniata*.

Sorbaria sorbifolia, A. Br. (*Spiraea sorbifolia*). Ash-leaf Spirea. As this plant suckers very badly it rarely forms a bush of attractive habit. It should be planted near the front of the border where it can be kept in control but far enough back so that its lower branches may be screened by low shrubs of more attractive habit. It is useful for its attractive foliage, its large fuzzy heads of small white flowers borne in July, and for its ability to grow in shade.

Spiraea. The spiraea or meadow sweet family is responsible for many of our finest shrubs. They are all low to medium height with characteristically fine wood and small to medium leaves. Many of the species and varieties are quite similar so that only the most popular and useful are given here. As they are typically bushy or graceful plants, bearing flowers profusely in June or July, their usual place is in intimate relationship with the house or at the front of a large shrubbery.

S. alba, Dur. A white-blooming native shrub useful in damp situations. In July it bears good sized panicles of bloom which are often open and leafy.

×*S. arguta*, Zabel. This is the showiest of the early flowering sorts. The flowers are white in round headed umbels appearing with the leaves. It is very graceful when in bloom but requires regular pruning to retain a good shape.

×*S. Biliardii*, Herincq. Much like the *S. alba* but with bright pink flowers in narrow and more dense panicles.

S. bumalda, Burvenich. This shrub is not so commonly grown as its varieties. The best known of these is Anthony Waterer, a compact shrub with narrow, dark green leaves and flat heads of light, bright crimson flowers in midsummer. Another variety is *Froebeli* (*S. Calosa Froebeli*) which is taller with broader leaves and similarly coloured flowers.

S. media, Schmidt. One of the earliest-blooming hardy spireas flowering a little later than *S. arguta*, but being much hardier. The bush is not so graceful as either the latter or *S. Vanhouttei*, but, when in full bloom and well covered with compact clusters of white flowers, it is very ornamental, and being very hardy, is especially desirable for the prairies. This is sometimes found under the name of *S. oblongifolia*, which is a synonym of *S. media subintegerrima*, and little different from the type.

Spiraea Thunbergii, Sieb. Small graceful shrub with narrower leaves than *S. arguta*, of which it is a parent. Flowers are white, appearing with the leaves. Foliage turns bright orange and red in fall. Not really hardy at Ottawa.

S. trichocarpa, Nakai. A fairly recent introduction which is promising. It is a shrub with gracefully arching branches and apparently hardier than *S. Vanhouttei* and may be used in place of the latter in slightly colder districts.

×*Spiraea Vanhouttei*. This very attractive and popular shrub is commonly but erroneously known as bridal wreath, which is the correct common name for *S. prunifolia* a shrub of exceptional merit which is not hardy at Ottawa. It needs no description here as its gracefully arching form and free blooming habit are known to all. It amply repays the attention of careful pruning every few years as soon as the blooming period is over.

Symphoricarpus. The species most commonly planted in the East is *S. albus*, Blake. Snowberry. It has large white berries which make it very ornamental in the fall. This is the *S. racemosa* of nursery catalogues. The variety *laevigatus* is a taller shrub with even larger berries borne in larger clusters. *S. orbiculatus*, Moench. (*S. vulgaris*) Indian currant is conspicuous in the fall for its red berries and useful in natural plantings. There is a more recently introduced species, *S. Chenaultii*, Rehd., which is a very neat little shrub with gracefully arching branches and fine foliage. It bears red berries which are very attractive but it usually kills to the snowline at Ottawa.

Syringa. Lilac. There are many species of this genus growing at Ottawa. All of them are attractive shrubs for the garden but space does not permit mention of any but the most useful. All the lilacs are tall shrubs. Usually they have large foliage of a rather dark colour which renders them excellent as dominant shrubs.

Syringa japonica, Decne, Japanese Lilac. A small tree form frequently grown as a large shrub. It has white flowers in very large rather loosely spreading panicles, which open towards the end of June after the other lilacs are over. Two other shrub forms are quite like it from an ornamental view point, these are *S. amurensis* and *S. pekinensis*.

S. Josikaea, Jacq. Hungarian Lilac. This has been commonly planted because it blooms after the common lilac is over. It is very like *S. villosa* but with deeper lilac flowers. At the Central Experimental Farm a hybrid between this and *S. reflexa* has been developed which is an excellent shrub with rosy lilac flowers in large panicles, this is *S. josiflexa* variety Guinevere. There is also a hybrid variety called Kim with deep lilac flowers.

S. persica, L. The Persian lilac is a somewhat smaller shrub than the others with neat foliage and earlier bloom.

×*Syringa Prestoniae*. This is a cross between *S. villosa* and *S. reflexa* developed by Miss Isabella Preston at the Central Experimental Farm. The shrubs are strong and of erect habit though a few have slightly arching branches like *S. reflexa* when in bloom. The bloom is considerably later than the common lilac and the trusses are larger and more openly graceful. There are several named varieties varying slightly in time of bloom and ranging in colour from light lilac pink to a very deep lilac.

The following varieties cover the range in time and colour:—

Light coloured, Audrey	Dark, Jessica
Desdemona	Calphurnia
Ursula	Alice
Virgilia	Elinor

More recent hybrids produced at the Central Experimental Farm are: Bellicent, Oberon, Romeo, Elaine, Gwynn, Ethel M. Webster, and Fountain.

S. villosa, Vahl. One of the many Chinese species. A strong-growing coarse-textured shrub which is quite like and blooms just after *S. Josikaea*. As the bloom is not so attractive as ×*S. Prestoniae* it is only useful as an individual in a collection.

S. vulgaris, L. The common lilac needs no description nor introduction. It is deservedly one of the best known and most frequently planted shrubs. There are many fine varieties varying from white to deepest purple and from single to double. Of the several hundred named varieties the following are among the best:—

White Single: Mont Blanc	Intermediate Single: Decaisne
Vestale	Mme F. Morel
White Double: Edith Cavell	Intermediate Double: Paul Thirion
Jeanne d'Arc	Président
Mme Lemoine	Poincaré
Pale Single: Jacques Callot	Président Viger
Lucie Baltet	Congo
Marechal Foch	Monge
Pale Double: Emile Gentil	Mrs. W. E.
Katherine	Marshall
Havemeyer	Negro
Président	Réaumur
Fallières	Dark Double: Charles Joly
Président Grevy	Mrs. Edward
Thunberg	Harding

Two other attractive lilacs which should be in every collection, but need not be used otherwise are *S. chinensis*, Willd. (*S. rothomagensis*) and *S. pubescens*, Turcz.

Tamarix. Tamarisk. These late-blooming pink-flowered shrubs with their very fine scale-like foliage should be planted more often in districts where they are hardy. They look extremely well in bays in the shrub border planted between groups of coarser-textured shrubs, or wherever their interesting growth is needed to attract the eye. Unfortunately they kill back badly at Ottawa and need careful pruning to maintain good shape. *T. pentandra*, Pall. seems to be the hardiest though *T. odessana*, Stev. will winter well in a sheltered position and is more useful as it is a lower shrub more suitable for small gardens.

Viburnum. There are several native species of viburnum besides those treated separately which are very good shrubs to use in natural plantings on account of their ornamental flowers, foliage, and fruits, and because they will succeed in shady places where other shrubs will not. One of the most attractive of these is *V. cassinoides*, L. Withe-rod. This flowers in June and is from 6 to 9 feet tall. Taller species which make attractive small trees are *V. Lentago*, L. Sheep Berry, and *V. prunifolium*, L. Black Haw. These have white flowers, black fruit and attractive foliage. Another sort which is distinct in habit of growth and foliage is *V. dentatum*, L. Arrow Wood.

V. Carlesii, Hemsl. A very ornamental low shrub with large clusters of fragrant pinkish flowers which appear at the same time as the leaves. This needs a bit of shelter at Ottawa until it becomes well established.

V. Lantana, L. Wayfaring Tree. This tall shrub has very attractive foliage, large flat clusters of white flowers, and showy fruit turning from red to dark purple as it ripens.

V. Opulus, L. The European cranberry is an attractive shrub usually grown in its sterile variety *roseum* (sterile) which is the common snowball, or guelder rose. This old-time favourite has of recent years fallen into disrepute due to its susceptibility to the attack of aphids. The shrubs must be sprayed with nicotine sulphate or kerosene emulsion, just as the leaf buds are bursting in the spring, and again a few days later before the leaves are fully out. Once the leaves have started to curl it is almost impossible to reach the insects.

V. trilobum, Marsh. (*V. opulus*) Highbush Cranberry. This is another native sort, but commonly used in gardens. It is much like the snowball, but hardier and bears red fruit.

Weigelia florida, Koehne. (*Diervilla rosea*, *D. candida*, etc.). Most of the varieties commonly grown in Canada belong to this species; the colour range is from white to red and the bloom is spread over a long period. They are very useful, attractive shrubs for general purposes. The horticultural variety *Eva Rathke* is a profuse bloomer, making a fine point of interest as a foundation shrub or at the front of a border. The variety *venusta* is very graceful and free flowering and is probably the most satisfactory at Ottawa where the weigelias need a sheltered location.

WOODY CLIMBERS

Climbers are used in three different ways in the landscape development of Canadian property. (1) To give shade. (2) To act as a screen to give privacy. (3) To cover, or screen the view of unattractive objects, or large bare wall spaces.

As shade providers they are used to climb up trellises, or wires or verandahs, pergolas, or summer houses. In such places where we are accustomed to walk or sit to read, or have tea, we require air, beauty and neatness just as much as

shade. The need here is for a hardy plant of neat habit with large leaves, yet open enough in habit of growth to allow free air circulation. Freedom from insect attack; fragrant bloom, or attractive fruit, are all added items in its favour. Dutchman's pipe is an excellent example.

As a screen to give privacy, rapid and dense growth is the prime consideration. Attractive foliage to act as a background for the more decorative displays of the garden is necessary. Flowers and attractive fruits are desirable features. Climbers on a lattice, or wire fence, are very satisfactory as boundary planting on the small place to back up a perennial border, as they take much less room than shrubs. Clematis and celastrus are very suitable in such places. Roses here are suitable but not to give privacy.

Where climbers are used to cover bare unattractive walls, or to hide unsightly objects, the need is for a self-clinging, dense growth which requires little attention, and has attractive foliage. Bloom and fruits are not so important. Hardiness and ability to cling to a wall are the first considerations. Virginia creeper is a good example.

However, every wall of a house should not be covered indiscriminately, nor should every old stump be left as an excuse to grow climbers. There is nothing to be gained by covering an architecturally attractive wall; and a stump covered by a vine is still obviously a stump where frequently an open lawn would be a great improvement.

Propagation

Climbers are usually grown from seeds or cuttings, though many of them may be reproduced by layering. (See directions for propagation of shrubs.)

Soil

Simply because a climber will cling to a stone or brick wall is no reason for it to be planted in the usual mixture of bricks, lath and plaster that is found close to the walls of a house. Wherever a climber is to be planted in such a location, a large hole should be dug two feet deep and three to four feet square. This is filled with good rich loam to give the plant a good start.

After they have reached a good size vines should be watered, and fed like other plants. (See notes on fertilizing shrubs.)

Pruning

The pruning of flowering vines is similar in principle to that of pruning flowering shrubs and should be done just as regularly. Vines which bear flowers on wood of the current season's growth should be pruned in the spring, others should be pruned after blooming by removing much of the wood that has just flowered.

Protection

For average purposes, climbers should not be used which are not sufficiently hardy to stand the climate without protection. The exception, of course, is the climbing rose or other plant grown on a trellis for the beauty of its own flowers which may be protected without too much trouble. Such a plant must be taken down from its support in the fall, laid on the ground and covered with brush. A covering such as waterproof roofing, or a box, is then put over it to shed the water. Provision must be made to allow sufficient circulation of air in the early spring to prevent "Sweating".

NOTES ON CLIMBERS HARDY AT OTTAWA

Ampelopsis, see *Parthenocissus*.

Aristolochia durior, Hill. (A. siphon) Dutchman's Pipe.

Although this fine climber is somewhat slow in becoming established and usually does not make much growth for two or three years, once it is well rooted it grows very rapidly and becomes one of the most beautiful and striking hardy vines available. The leaves are large, heart-shaped and deep green and give a semi-tropical effect. It has a heavier look than some other vines and seems more in keeping with the massive style of verandah than with one of lighter design. It is of twining habit and looks well on either a trellis or verandah. The flowers, which are partially hidden by the large leaves, are brown and of a peculiar shape, much resembling a Dutchman's pipe. It is a native of the Eastern States and grows from 20 to 30 feet or more high.

Celastrus articulata, Thunb. Japanese Bittersweet. Although the native species is very attractive, this, in some respects, is still more so, as the fruits are smaller, more numerous, and the whole effect more graceful. It is, however, after the leaves have fallen that the fruit is so noticeable, as before that time, that of the native climbing bittersweet is, perhaps, more conspicuous. There is a greater contrast between the outside and inside of the fruit of the Japanese than there is in *Celastrus scandens*, the colours being distinct yellow and orange. It is quite hardy, is a rapid grower, and very desirable, especially for covering fences. One should be sure of getting a plant having both male and female flowers to ensure having a crop of fruit.

Celastrus scandens, L. American Bittersweet. Wax-Work. This is one of the best native climbers. It is a very rapid, even rampant grower, with glossy green leaves and highly ornamental fruit, and twines about everything it can get hold of. It is particularly free from injurious insects and diseases. In the autumn and early winter, after the leaves have fallen, the attractiveness of this vine is continued by the orange coloured fruit or berries which, after the early frosts, crack open, revealing a scarlet interior. In procuring this vine one should get one which is known to fruit or has been propagated from one that is known to fruit, as some vines have only male blossoms and there is no fruit on such.

× *Clematis Jackmani*, Th. Moore. Jackman Clematis. This is the most satisfactory of the large-flowered clematis. It is a very free bloomer and remains in flower for several weeks. The flowers are large and rich violet-purple in colour, with a velvety appearance. Where a strong colour effect is desired this is a good plant to use. There are many large-flowered hybrid clematis and a good range in colour can easily be obtained, but these are not hardy at Ottawa, except under exceptional circumstances.

The chief defect in these varieties is that they are subject to the injury known as collar rot, especially the first year or two after setting out, but once they become well established they usually thrive well.

Clematis ligusticifolia, Nutt. Western Virgin's Bower. The western virgin's bower is a native of the drier districts of Western Canada and the United States, and when grown in Eastern Canada it should be planted in as dry a situation as possible. It is particularly valuable in the Prairie Provinces, where the number of hardy perennial climbers is limited and where the summers are relatively dry. There it makes an excellent climber for a trellis on the verandah or house and reaches a height of 20 feet or more. The leaves are glossy and attractive in appearance and these, combined with the numerous small white flowers which this native vine bears, make it a very desirable plant, especially for the colder and drier parts of Canada.

Clematis paniculata, Thunb. Japanese Clematis. This clematis which is also called sweet autumn clematis because of its sweet-scented flowers, is a very ornamental climber, and because it blooms in September is particularly valuable where it succeeds well. A warm and well-drained situation is best for it. At Ottawa it often kills out if not given some protection before winter sets in and is really not as generally satisfactory as in the warmer districts. The flowers are larger and whiter than most of the other small-flowered species. When it succeeds well it reaches a height of 15 feet or more.

Clematis tangutica, Korsh. Chinese Clematis. An easy clematis to grow. It has large bell-shaped yellow flowers followed by ornamental seed heads. It should be more commonly planted.

Clematis virginiana, L. Virgins Bower. The virgin's bower is a common native climber in Eastern Canada and is not used as much as it should be for beautifying the home. Next to the Virginia creeper it is, perhaps, the most satisfactory native climber to plant, and where Virginia creepers are badly affected by leaf-hoppers or thrips it may give better satisfaction than the latter. It is a very rapid grower and soon covers anything within reach, attaining a height of 20 feet or more. It clings by tendrils and should have something to which these can fasten.

Clematis vitalba, L. Travellers' Joy. The traveller's joy is a European species very much like the virgin's bower, and where the latter cannot be obtained the traveller's joy is a good substitute. It is even a stronger grower than the virgin's bower and reaches a height of from 20 to 30 feet.

Clematis serratifolia, Rehd. A Korean clematis producing pale yellow flowers in great abundance in August and early September. Should be more commonly used. Mr. F. L. Skinner of Dropmore, Manitoba, has produced a hybrid variety of this which is a worth-while novelty.

Lonicera hirsuta, Eaton. Hairy Honeysuckle. There are several native climbing honeysuckles, but this is perhaps the best of them. It bears attractive orange-yellow flowers during the month of June. It is not, however, as satisfactory a climber as the scarlet trumpet honeysuckle, as its blooming season is soon over.

Lonicera japonica Halliana, Nichols. Hall Japanese Honeysuckle. This honeysuckle is not hardy at Ottawa, but is often planted, since it is much recommended when it succeeds, as it does in the warmest parts of Canada. The flowers are small and white, turning to yellow. Where hardy it blooms well during the latter part of summer.

Lonicera Periclymenum, L. Woodbine, English Honeysuckle. Because of the agreeable, spicy odour of its flower and its association with the "Old Land" this is a very popular climber with many where it succeeds well. At Ottawa, however, it has not proved very hardy and usually there are but few flowers and occasionally the vines are killed out altogether.

Lonicera sempervirens, L. Scarlet Trumpet Honeysuckle. No other honeysuckle has proved so desirable at Ottawa as this one. It blooms almost continuously from the first week of June until late in the autumn, and the bright scarlet, trumpet-shaped flowers, which are borne profusely, are very effective. It is a native of the Eastern United States and almost perfectly hardy at Ottawa.

Lycium chinese, Mill. Chinese Matrimony-vine. Where a tall-growing climber is not desired and something is needed for covering rocks, stumps or trees, this is very useful. While neither the leaves nor flowers are particularly ornamental, the graceful habit of the plant commends it, together with the fact that in the autumn the bright scarlet fruit gives it a very attractive appearance.

The European or common matrimony-vine *Lycium europaeum* is a desirable climber also, but it is not so good as *L. chinese*, as the fruit is smaller and the foliage not so attractive.

Menispermum canadense, Marsh, Moonseed. This is a native climber which reaches a height of 12 to 15 feet. It is perfectly hardy at Ottawa. The foliage is clean and attractive, being lobed somewhat like that of the maple. In the fall it has attractive bluish-black fruits. It may be used to good advantage on verandah trellises or pergolas.

Parthenocissus quinquefolia, Planch. (*Ampelopsis quinquefolia*) Virginia Creeper. This native climber is a rapid grower and one of the hardiest and best known vines. The leaves turn various shades of red in the autumn and make it attractive. As a rule the tendrils have little or no ability to cling to smooth walls, so that the plant usually grows in graceful festoons.

The variety *hirsuta*, Planch. has slightly duller leaves which are downy. This has the ability to cling to smooth surfaces so makes a better climber than the species. It also is less susceptible to the attacks of leaf hoppers which frequently cause damage to the species.

The variety *Engelmannii*, Rehd. This is the one most commonly handled by eastern nurseries. It has similar foliage to that of the species though smaller and really more attractive. As the tendrils are furnished with disks it has the ability to cling to walls but plants should be chosen which have this character strongly developed.

Parthenocissus tricuspidata, Planch. (*Ampelopsis Veitchii*), Japanese, or Boston Ivy. This is not quite hardy enough for Ottawa though it sometimes grows fairly well on a wall with north exposure. Where it is hardy, it forms a beautiful vine, and is unsurpassed in ability to cling to a wall. The foliage is very ornamental, being bright green and shiny, and the autumn colour is usually good. The usual form is the variety *Veitchii*, Rehd. There is a smaller leaved form *Lowii*, Rehd, and a more vigorous variety *robusta*, Hort.

Roses, Climbing Varieties. The climbing roses give wonderfully charming effects in the garden and about the house and, as hardier sorts are originated, their use will, no doubt, become much more general than it is at present. Now, the climbing roses that are available have all to be protected in winter at Ottawa and other places where the winters are equally severe. Even when protected there are many which are not satisfactory, but the following have proved among the hardiest and most reliable: Dorothy Perkins, Dr. Van Fleet, Chantillon Rambler, Paul's Scarlet, Goldfinch, Doubloons, New Dawn, Patricia Macoun.

Vitis vulpina, L. Riverbank Grape. The riverbank grape is very hardy and grows wild as far west as Manitoba. It makes an ornamental climber and is a very rapid grower. The male and female flowers of this species are grown on different vines and to have the delightful perfume of the flowers, for which this species and other grapes are noted, one with male flowers should be planted. However, by having two vines, one with male and the other with female flowers, planted close together, one could have both the perfume and the fruit. One drawback to having the wild grape used as a climber near the house is that it is subject to the attacks of leafhoppers, which often disfigure the leaves. In exposed places, however, where there is a good circulation of air, they will not be so troublesome.

Wisteria sinensis, Sweet. Chinese Wisteria. This beautiful climber is not hardy at Ottawa without protection, but if planted in a naturally protected place and the vine laid down and protected before the winter sets in, it will bloom fairly well and is of such striking beauty when in bloom that a little

special effort is well worth while. If left unprotected the wood will withstand the cold, or there will be very little killing back, but the flower buds are killed and there will be no bloom.

Wisteria floribunda, Nutt. The Japanese wisteria is also a very ornamental climber, and probably a little hardier.

Other climbers to which reference should be made which are not hardy at Ottawa, but which succeed in the milder parts of Canada are:—

Actinidia arguta, Miq. This is a Chinese vine which makes rapid growth and has attractive fruit. It kills back badly at Ottawa.

Campsis radicans, Seem. (*Tecoma* or *Bignonia radicans*). Trumpet Vine. This makes strong growth at Ottawa, but kills back each year and does not bloom well.

Euonymus radicans, Sieb. This evergreen climber is a little hardier than *Hedera helix* but not hardy enough for Ottawa. There are several varieties the best of which is probably *vegeta*, Rehd, but all are usually grown as low trailing shrubs in the rock garden or against a low wall.

Hedera helix, var. *baltica*, Rehd. L. English Ivy. One of the very few good evergreen climbers. A hardy form would be very desirable.

Polygonum baldschuanicum, Reg. The silver fleecevine is a very good climber in milder districts. It bears masses of small white to pinkish flowers in late summer.

INSECT PESTS OF ORNAMENTAL SHRUBS

Many ornamental shrubs are injured and sometimes killed by insects; sometimes the damage to the constitution of the bush is very slight, although the immediate effects are unsightly and displeasing.

Insects affecting shrubs fall into three main classes: (1) the leaf-eating insects such as caterpillars, sawfly larvae and leaf-eating beetles; (2) the sucking insects which include aphids, scale insects and leaf-hoppers; and (3) the borers which work beneath the bark or in the solid wood of the trunk or branches.

With each type, a different method of control is advocated; most leaf-eating insects are easily controlled by the application of a spray of lead arsenate. This insecticide is generally used at the rate of 1 pound of powdered lead arsenate to 20 or 25 gallons of water; for smaller quantities, use from 6 to 12 level teaspoonfuls to 1 gallon of water. This spray does not injure the foliage, is cheap, easy to prepare, and effective. Soap should not be added to sprays containing arsenic.

Sucking insects cannot be controlled by the application of a stomach poison like lead arsenate. These insects derive their nourishment by sucking the juices from the leaves and stems, and control can only be effected by means of an insecticide which kills on contact with the insect. Foremost among contact insecticides is nicotine sulphate used at the strength recommended by the manufacturer. It is very satisfactory against aphids or plant lice and does not injure the foliage.

Most of the leaf-eating and some of the sucking insects may be controlled by DDT, either as a three or five per cent dust or as a spray. The "wetttable" form of DDT is the most convenient material to use if the DDT is used as a spray. Oil solutions of DDT as sold in drug and hardware stores for the control of household insects should not be applied direct to the foliage of trees and shrubs.

The borers are more difficult to handle. Badly infested shrubs should be cut out and burned. If a valuable specimen is involved and if the infestation is not

very severe, the insects may be killed by the injection of a few drops of carbon bisulphide or carbon tetrachloride into the tunnel; the opening of the tunnel should then be sealed with putty or clay to retain the toxic fumes.

A vigorous growth induced by proper fertilization and watering in dry weather helps the trees to overcome the effects of all types of insect injury.

Advice on the control of insects affecting ornamental trees, shrubs, and hedges is given by the Division of Entomology, Science Service, Department of Agriculture. It will facilitate matters greatly if specimens of the insects are sent in along with enquiries; if the insects are not obtainable, samples of the work or injury would help in the identification of the injurious insects concerned.

Packages or parcels, not exceeding 1 lb. in weight, and letters may be sent post free if addressed to the Dominion Entomologist, Department of Agriculture, Ottawa.

SHRUBS FOR VARIOUS PURPOSES AND SITES

The following tables give information of a more definite nature and should be studied in conjunction with the section on the uses of shrubs in the landscape, pages 3 to 8, to be of real assistance in the selection of shrubs for definite purposes.

Due to the wide range of soil and climate throughout Canada, a table of this sort is limited in its usefulness, particularly in respect to the height of shrubs, and consequently their habit of growth.

The abbreviations used in the colour of foliage column are as follows: L-G—Light green; G—Mid-Green; D-G—Dark green; G.G.—Grey green. Usually the grey effect is

produced by the underside of the leaf being greyish white; Y.G.—Yellow green; B-G—Blue green, etc.; a small “s” signifies that the leaf is shiny.

Under the heading of soil the word “loam” means that the shrub needs good loam soil which is well drained. The other words are self explanatory; they do not mean necessarily that the shrub prefers “wet” soil or “poor” soil, but that it will grow under those conditions where others will not.

The same applies to the column headed “light”. All shrubs prefer sunlight to develop into well shaped specimens; but some will grow in partial shade.

NAME	Habit of growth	Foliage		Bloom		Soil	Light	Remarks	Use in landscape composition
		Texture	Colour	Colour	Period				
SHRUBS OVER 12 FEET									
<i>Amelanchier canadensis</i>	Erect	Medium	G.	White	May	Various	P. shade	Black berries.	Natural plantings.
<i>Caragana arborescens</i>	Erect	Fine	L.G.	Yellow	May-June	Various	Sun	Good hedge.	Filler.
<i>Philadelphus grandiflora</i>	Erect	Coarse	D.G.	White	June-July	Various	Sun	Regular pruning.	Dominant.
<i>Rhamnus Frangula</i>	Erect	Medium	G.	Inconsp.		Clay	P. shade	Black berries.	Filler hedge.
<i>Rhus typhina</i>	Open irregular	Medium	R.G.	Greenish		Gravelly	Sun	Red seed heads.	Natural plantings.
<i>Syringa japonica</i>	Round top	Coarse	D.G.	White	June-July	Various	Sun	Latest to bloom.	Use standards as specimens.
<i>XSyringa Prestoniae</i>	Erect	Coarse	G.	Pink, Mauve	June	Sandy loam	Sun	Very large trusses.	Dominant, all lilacs get leggy at this height.
<i>Syringa villosa</i>	Erect	Coarse	G.	Lavender	June	Sandy loam	Sun	Disagreeable odour.	Dominant, all lilacs get leggy at this height.
<i>Syringa vulgaris</i>	Erect	Coarse	D.G.	White Purple	May-June	Various	Sun	Regular pruning.	Dominant, all lilacs get leggy at this height.
<i>Viburnum prunifolium</i>	Horizontally branching small tree	Medium	G.	White	May-June	Moist	P. shade	Black berries.	Dominant in natural groups.
SHRUBS—9-12 Feet									
<i>Chionanthus virginica</i>	Erect open	Medium	D.G.	White	June-July	Moist	Sun	Misty bloom.	Odd, dominant.
<i>Hydrangea paniculata grandiflora</i>	Erect open	Coarse	G.	White, Pink	Aug.-Sept.	Dry	Sun	Prune in spring.	Standard specimen.
<i>Lonicera Maackii</i>	Erect	Medium	D.G.	White	May-June	Various	Sun	Red berries.	Dominant.
<i>Philadelphus cordifolius</i>	Erect	Coarse	D.G.	White	June-July	Loam	Sun		Dominant.
<i>Prunus triloba</i>	Erect	Coarse	G.	White-Pink	May	Clay	Sun		Standard specimen.
<i>Philadelphus coronarius aureus</i>	Erect	Medium	G.	White	June-July	Loam	Sun	Red fruits.	Filler.
<i>XRosa rubra Carmenetta</i>	Arching	Medium	R.G.	Pink	July	Various	Sun	Prune regularly.	Mass for foliage effect.
<i>Syringa Josikaea</i>	Erect	Coarse	G.	Lilac	June	Various	Sun	Prune regularly.	Mass, dominant.
<i>XSyringa Prestoniae</i>	Erect	Coarse	G.	Pink-Mauve	June	Sand loam	Sun	Prune regularly.	Dominant specimen.
<i>Syringa vulgaris</i>	Erect	Coarse	D.G.	White-Purple	May-June	Various	Sun	Prune regularly.	Dominant specimen.
<i>Viburnum Lantana</i>	Erect	Coarse	R.G.	White	May	Moist	P. shade	Black berries.	Dominant mass.
<i>Viburnum Lentago</i>	Erect	Coarse	G.G.	White	May	Moist	P. shade	Black berries.	Use for grey foliage.
<i>Viburnum molle</i>	Spreading	Coarse	G.	White	June	Moist	P. shade	Black berries.	Mass for natural planting.

NAME	Habit of growth	Foliage		Bloom		Soil	Light	Remarks	Use in landscape composition
		Texture	Colour	Colour	Period				
				SHRUBS—6-9 FEET					
<i>Cotinus coggygria</i>	Open spreading	Medium	B.G.	Purple smoke	July	Moist	Sun	Feathery seed cl.	Mass.
<i>Cotoneaster integerrima</i>	Erect	Medium	D.G.	Small pink	June	Dry	Sun	Red berry.	Mass, for effect of bark.
<i>Cornus alba sibirica</i>	Spreading	Coarse	R.G.	White	May-June	Moist	P. shade	Red bark	Mass, for effect of bark.
<i>Cornus stolonifera flaviramea</i>	Spreading	Coarse	G.	White	May-June	Moist	P. shade	Yellow bark.	Mass or dominant.
<i>Hydrangea paniculata grandiflora</i>	Spreading	Coarse	G.	White pink	Aug.-Sept.	Dry	Sun	Prune in spring.	Specimen or filler.
<i>Lonicera tatarica</i>	Spreading	Medium	G.Y.G.	White pink	May-June	Various	P. shade	Red berry.	Mass.
<i>Philadelphus coronarius</i>	Spreading	Medium	Y.G.	White	June-July	Various	Sun	Prune regularly.	Emphasis.
<i>Philadelphus coronarius aureus</i>	Spreading	Medium	Y.G.	White	June-July	Various	Sun	Prune regularly.	Mass.
<i>Physocarpus opulifolius</i>	Spreading	Medium	D.G.	White	June	Various	P. shade	Red seed clusters.	Mass.
<i>Physocarpus opulifolius aureus</i>	Spreading	Medium	Y.G.	White	June	Various	Sun	Red seed clusters.	Emphasis.
<i>Prunus cerasifera Pissartii</i>	Erect	Medium	P.	Pink	May	Clay loam	Sun	Not hardy at Ottawa	Accent.
<i>Rhus cotinus—see Cotinus.</i>									
<i>Ribes Aureum</i>	Spreading	Medium	D.G.	Yellow	May	Various	P. shade	Yellow currants.	Mass filler.
<i>Rosa Harrison Yellow</i>	Spreading	Fine	Y.G.	Yellow	June	Clay loam	Sun	Red hips.	Mass. for interest of foliage and fruit.
<i>Rosa rubrifolia</i>	Open spreading	Fine	P.	Deep pink	June	Clay loam	Sun	Red hips.	Mass.
<i>Sambucus canadensis</i>	Spreading	Coarse	Y.G.	White	May	Wet	P. shade	Black fruit.	Mass.
<i>Sambucus racemosa</i>	Spreading	Coarse	R.G.	White	May	Wet	P. Shade	Red fruit.	Mass.
<i>Syringa vulgaris (varieties)</i>	Open crest	Coarse	D.G.	White	May-June	Various	Sun	Careful pruning.	Specimen, dominant.
<i>Viburnum Opulus</i>	Erect spreading	Coarse	D.G.	White	June	Wet	P. shade	Spray in spring for aphids.	Dominant, mass.
<i>Viburnum trilobum</i>	Erect spreading	Coarse	D.G.	White	June	Wet	P. shade	Red berries.	Dominant, mass.
				SHRUBS—4-6 FEET					
<i>Amorpha fruticosa</i>	Open spreading	Medium	Y.G.	Purplish	June	Dry	Sun	Leggy.	Filler.
<i>Caragana frutex</i>	Erect	Fine	L.G.	Yellow	May-June	Various	Sun	Suckers.	Mass filler.
<i>Caragana arborescens Lorbergii</i>	Erect	Fine	Y.-G.	Yellow	May-June	Various	Sun	Very fine foliage.	Interest.
<i>Cornus elegantissima</i>	Spreading	Coarse	W.G.	White	May-June	Moist	Sun	Attractive foliage and red bark.	Interest specimen.
<i>Cotoneaster acutifolia</i>	Spreading	Medium	D.G.	Pinkish	May	Various	Sun	Red berries.	Mass filler.
<i>Forsythia intermedia</i>	Spreading	Medium	Y.G.	Yellow	April-May	Various	P. shade	Bloom before leaves.	Filler or interest.
<i>Forsythia ovata</i>	More bushy	Medium	Y.G.	Yellow	June	Various	P. shade	Hardier than above.	Filler or interest.
<i>Halimodendron halodendron</i>	Bushy	Fine	G.G.	Pink	June	Dry	Sun	Very thorny.	Interest of foliage.
<i>Hippophae rhamnoides</i>	Open bushy	Fine	W.G.	Inconsp.		Dry	Sun	Foliage silvery.	Interest of foliage better than above.
<i>Lespedeza formosa</i>	Erect bushy	Fine	G.	Purple	Sept.	Various	Sun	Kills to snowline.	Old. interest of late bloom.
<i>Ligustrum amurense</i>	Bushy	Medium	D.G.	White	June	Various	Sun	Sheltered position.	Filler, he lge.
<i>Lonicera Morrowii</i>	Horizontal	Medium	B.G.	Yellow	June	Various	Sun	Red berries.	Interest.
<i>XPhiladelphus Lemoinei erectus</i>	Erect	Fine	G.	White	June-July	Various	Sun	All require careful regular, pruning.	Many named varieties like these.
<i>Philadelphus hybrid Avalanche</i>	Bushy	Medium	G.	White	June-July	Various	Sun		All useful as filler or interest.
<i>Philadelphus hybrid Virginal</i>	Open erect	Medium	D.G.	White	June-July	Various	Sun	Red hips, smooth wood.	Specimen interest.
<i>Rosa blanda</i>	Erect	Medium	R.G.	Pink	June	Various	Sun		All roses need to be in masses as filler or points of interest.
<i>Rosa rugosa</i>	Erect	Medium	G.	White-red	June	Various	Sun	Suckers, red hips.	All roses need to be in masses as filler or points of interest.
<i>Sambucus nigra aurea</i>	Bushy	Coarse	Y.G.	White	June	Various	Sun	Gold foliage, cut back each spring.	Emphasis, interest.
<i>Sorbaria sorbifolia</i>	Open erect	Medium	D.G.	White	July	Moist	P. shade	Kills back each year but useful.	Interest, suckers badly
<i>XSpiraea arguta</i>	Erect bushy	Fine	Y.G.	White	May	Various	Sun	Regular pruning.	Interest.
<i>XSpiraea Bihardii</i>	Erect bushy	Medium	R.G.	Pink	July	Moist	Sun		Interest or filler.

<i>Spiraea media</i> <i>Spiraea trichocarpa</i> X <i>Spiraea Vanhouttei</i> <i>Syringa persica</i> <i>Tamarix pentandra</i> <i>Viburnum Carlesii</i> <i>Weigelia florida rosea</i>	Erect bushy Erect bushy Erect bushy Open erect Open Bushy	Fine Med.-fine Fine Medium Fine Coarse Coarse	G. G. B.G. D.G. B.G. G.G. Y.G.	White White White Lilac Pink Pink Rose	May May June May July-Sept. May June-Aug.	Various Various Various Dry Moist Various	Sun Sun Sun Sun P. shade Sun	Hardy. Hardier than Van- houttei. Very fine shrub. Earliest lilac. Sheltered position. Needs slight shelter.	Filler. Filler. Specimen filler. Interest, filler. Interest. Specimen interest. Filler.
SHRUBS—2-4 FEET									
<i>Amorpha canescens</i> <i>Berberis Thunbergii</i>	Bushy Bushy	Fine Fine	G.G. G.	Blue Inconsp.	June	Dry Various	Sun P. shade	Fall colours and berries.	Interest of foliage. Interest and hedge.
<i>Berberis Thunbergii</i> atropurpurea <i>Caragana pygmaea</i>	Bushy Bushy	Fine Fine	P. G.	Inconsp. Yellow	June	Various Various	Sun Sun	Very fine foliage.	Interest of foliage hedge. Interest, standards used as specimens.
<i>Chaenomeles japonica</i> (Cydonia) <i>Daphne Mezereum</i> X <i>Deutzia Lemoinei</i> <i>Diervilla florida alba</i> <i>Genista tinctoria</i> <i>Hydrangea arborescens</i> <i>Kerria japonica</i> <i>Mahonia Aquifolium</i>	Bushy Open erect Bushy Bushy Bushy Spreading Spreading Spreading	Medium Medium Medium Fine Coarse Medium Coarse	G.s. B.G. G. Y.G. G. Y.G. G.G.s.	Red Pinkish White White Yellow White Yellow	April-May April-May June June-Aug. Aug.-Sept. July-Aug. May-June May	Various Moist Various Various Sandy Various Sandy	Sun Sun Sun Sun P. shade Sun P. shade	Needs shelter. Flowers before leaves. Sheltered position. Sheltered position. Cut back each spring. Cut back each spring. Cut back each spring. Black berries, ever- green.	Filler. Interest. Interest. Filler. Interest. Interest, mass. Interest, mass. Interest, with conifers.
X <i>Philadelphus Fleurs de Neiges</i> <i>Potentilla fruticosa</i> <i>Prunus nana</i> <i>Ribes alpinum</i> <i>Robinia hispida</i> <i>Rosa Hugonis</i>	Bushy Bushy Bushy Open spreading Spreading	Medium Fine Fine Medium Medium Fine	Y.G. G. G.G. G. D.G. G.	White Yellow Rose pink Yellow Pink-lilac Yellow	June-July June May May-June June June	Various Sandy Clay Various Various Various	Sun Sun Sun Sun Sun Sun	Regular pruning. Very hardy. Very hardy. Needs shelter. Black hips.	Interest, many varie- ties with similar uses. Interest, filler. Filler, interest. Filler, interest. Mass low roses on banks or against back- ground of evergreens. Mass low roses on banks or against back- ground of evergreens.
<i>Rosa acicularis</i> X <i>Spiraea bumalda</i> A. Waterer <i>Spiraea callosa alba</i> <i>Spiraea Thunbergii</i> <i>Symphoricarpos albus laevigata</i> <i>Symphoricarpos Chenaultii</i>	Spreading Bushy Bushy Bushy Spreading Spreading	Fine Fine Fine Medium Fine Medium	B.G. D.G. L.G. L.G. B.G. G.	Pink Pink White White Inconsp. Inconsp.	June July July May June-July	Various Moist Moist Dry Moist Moist	Sun P. shade Sun Shade P. shade Sun	Red hips. Needs slight shelter. Needs slight shelter. Bloom as leaves open. White berries. Very attractive foli- age.	Interest specimen.
SHRUBS UNDER 2 FEET									
<i>Cytisus nigricans</i>	Erect	Fine	B.G.	Yellow	May	Dry	Sun		All these low shrubs are useful in rock gardens or as interest at front of borders.
<i>Cytisus purgans</i>	Erect	Fine	B.G.	Yellow	May	Dry	Sun		All these low shrubs are useful in rock gardens or as interest at front of borders.
<i>Cytisus purpureus</i>	Procumbent	Fine	B.G.	Purple	May	Dry	Sun		All these low shrubs are useful in rock gardens or as interest at front of borders.
<i>Cotoneaster horizontalis</i> <i>Cotoneaster adpressa</i> <i>Daphne Cheorum</i>	Procumbent Procumbent Procumbent	Fine Fine Fine	D.G. D.G. B.G.	Inconsp. Inconsp. Purplish pink	April-May	Dry Dry Acid	Sun Sun Sun		All these low shrubs are useful in rock gardens or as interest at front of borders.
<i>Euonymus radicans</i> <i>Lonicera spinosa Alberti</i>	Trailing Arching	Medium Fine	G.-W. D.G.	Inconsp. Pale pink	June	Moist Dry	P. shade Sun	Needs shelter. Forms a mound.	Interest of variegated foliage. Covering banks.

SHRUBS THAT ARE HARDY IN EACH DISTRICT THROUGHOUT CANADA

The following tables show the more common shrubs and woody climbers growing at each of the branch farms throughout the Dominion Experimental Farms System, together with the Ontario stations at Guelph and Vineland. They are, therefore, a check on the hardiness of the species, and a help in showing which species may be grown in each district with reasonable assurance of safety.

There is, however, this weakness; all the species have not been tried at each of the stations, so that some shrubs

might prove hardy at stations where they are not shown.

The letter "H" signifies that the plants are reasonably hardy under average conditions. "S" means that it requires a location sheltered from prevailing wind, and direct rays of full spring sunshine. "D" denotes that the species is of doubtful hardiness, receiving some injury in average years which renders the plant rather unsatisfactory from an ornamental viewpoint.

TABLE SHOWING SHRUBS GROWN AT VARIOUS EXPERIMENTAL FARMS

H—Hardy D—Kill to Snowline S—Need sheltered site.

	Alta.			B.C.			Man.		N.B.		N.S.		Ontario				Quebec				Sask.			
	Beaverlodge	Lacombe	Lethbridge	Agassiz	Saanichton	Summerland	Windermere	Brandon	Morden	Fredericton	Kentville	Nappan	Guelph	Kapuskasing	Ottawa	Vineland	Charlottetown	Cap Rouge	Lennoxville	Ste-Anne de la Pocatiere	Indian Head	Rosthern	Scott	Swift Current
<i>Acer ginnala</i> (Maxim.)																								
<i>Acer glabrum</i> (Torr.)																								
<i>Acer palmatum</i> (Thunb.)																								
<i>Actinidia arguta</i> (Miq.)																								
<i>Amelanchier alnifolia</i> (Nutt.)																								
<i>Amelanchier canadensis</i> (Med.)																								
<i>Amorpha canescens</i> (Nutt.)																								
<i>Amorpha fruticosa</i> (L.)																								
<i>Amelopsis</i> (see <i>Parthenocissus</i>)																								
<i>Azalea</i> (see <i>Rhododendron</i>)																								
<i>Berberis koreana</i> (Pall.)																								
<i>Berberis Thunbergii</i> (D.C.)																								
<i>Berberis Vernae</i> (Schneid)																								
<i>Buddleia Davidi</i> (Franch.)																								
<i>Buxus sempervirens</i> (L.)																								
<i>Caragana arborescens</i> (Lam.)																								
<i>Caragana chamlagu</i> (Lam.)																								
<i>Caragana frutex</i> (K. Koch.)																								
<i>Caragana Lobergii</i> (Kochne.)																								
<i>Caragana tragacanthoides</i> (Poir.)																								
<i>Caragana pygmaea</i> (D.C.)																								
<i>Cornus alba</i> (L.)																								
<i>Cornus alba argenteo-marginata</i> (Rehd.)																								
<i>Cornus alba Spaethii</i> (Wittm.)																								
<i>Cornus alba sibirica</i> (Loud.)																								
<i>Cornus alternifolia</i> (L.)																								
<i>Cornus Baileyi</i> (Coults.)																								
<i>Cornus florida</i> (L.)																								
<i>Cornus mas</i> (L.)																								
<i>Cornus stolonifera flaviramea</i> (Rehd.)																								

TABLE SHOWING SHRUBS GROWN AT VARIOUS EXPERIMENTAL FARMS

H—Hardy D—Kill to Snowline S—Need sheltered site.

	Alta.		B.C.			Man.		N.B.		N.S.		Ontario				Quebec			Sask.			
	Beaverlodge	Lacombe	Agassiz	Saanichton	Summerland	Brandon	Morden	Fredericton	Kentville	Nappan	Guelph	Kapuskasing	Ottawa	Vineland	Charlottetown	Cap Rouge	Lennoxville	Ste-Anne de la Pocatiere	Indian Head	Rosthern	Scott	Swift Current
Prunus virginiana (L.)	H	H				H	H				H		H	H	H	H		H		H	H	H
Rhamnus cathartica (L.)	H	H				H	H				H		H	H	H	H		H		H	H	H
Rhamnus frangula (L.)																						
Rhamnus tinctoria (Waldst.)																						
Rhodotypos scandens (Mak.) (Kerriodes.)			H	H							D											
Rhododendron ponticum (L.)			H	H																		
Rhododendron molle (G. Don.) (Azalea mollis)			H	H																		
Rhus Cotinus (see Cotinus)																						
Rhus glabra (L.)																						
Ribes alpinum (L.)																						
Ribes aureum (Pursh.)																						
Ribes odoratum (Wendl.)																						
Rosa canina (L.)																						
Rosa villosa (L.) (pomifera, Herrm.)																						
Rosa rubrifolia (Vill.)																						
Rosa rugosa (Thunb.)																						
Sambucus canadensis (L.)																						
Sambucus racemosa (L.)																						
Shepherdia argentea (Nutt.)																						
Sorbaria sorbifolia (A. Br.)																						
XSpiraea arguta (Zabel.)																						
XSpiraea Billiardii (Henricq.)																						
XSpiraea Bumalda (Burvenich)																						
Spiraea media (Schmidt.)																						
Spiraea prunifolia (Sieb. and Zucc.)																						
Spiraea Thunbergi (Sieb.)																						
Spiraea trichovarpa (Nakai)																						
XSpiraea Vanhouttei.																						
Symphoricarpus albus laevigatus (Blake.) (racemosus)																						
Symphoricarpus Chenaultii (Rehd.)																						
Symphoricarpus occidentalis (Hook.)																						
Symphoricarpus orbiculatus (Moench.) (vulgaris)																						
Syringa amurensis (Rupr.)																						
Syringa chinensis (Wild.) (Rothamogensis)																						
Syringa Japonica (Decne.)																						
Syringa Josikaea (Jacq.)																						
Syringa persica (L.)																						
Syringa pekinensis (Rupr.)																						
Syringa villosa (Vahl.)																						
Syringa vulgaris (L.)																						
XSyringa Prestoniae																						
Tamarix odessana (Stev.)																						
Tamarix pentandra (Pall.)																						
Viburnum Carlesii (Hemsl.)																						
Viburnum dentatum (L.)																						
Viburnum Lantana (L.)																						
Viburnum Lentago (L.)																						
Viburnum Opulus (L.) (sterile)																						
Viburnum trilobum (Marsh.)																						
Weigelia florida (Seib. and Zucc.) (rosea Hort.)																						

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